

INLAND ENC HARMONIZATION GROUP (IEHG)

**INLAND ELECTRONIC NAVIGATIONAL CHART
PRODUCT SPECIFICATION**

IEHG Publication S-401

**Annex A
Data Classification and Encoding Guide**

Version 1.2.0

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Document Control

Version	Version Type	Date	Approved By	Signed Off By	Role
1.2.0 Draft 01	Draft based on published version of S-101 1.2.0, but without attributes				
1.2.0 Draft 0.2	Draft based on published version of S-101 1.2.0,				
1.2.0 Draft 0.3	Updated draft for the 18 th IEHG meeting				
1.2.0 Draft 0.4	Draft with updates from the 18 th IEHG meeting				
1.2.0 Draft 0.5	Updated draft for the COMEX ² meeting on 19/20 November 2024				
1.2.0 Draft 0.6	Updated draft includes proposals of the COMEX2 meeting, all SCAMIN in the tables, small case acronyms for inland specific elements, graphs either updated or legends added				
1.2.0 Draft 0.7	Amendments of S-101 edition 2.0.0 taken into account (changes adopted, but changes that might have consequences for S-401 marked yellow)				
1.2.0 Draft 0.8	Further amendments of associations, based on Hasselt meeting of COMEX ²				
1.2.0 Draft 0.9 to 0.11	Further amendments				
1.2.0	Amendments adopted at the IEHG meeting		IEHG		

1 Overview

1.1 Preface

The "Data Classification and Encoding Guide" has been developed to provide consistent, standardized instructions for encoding S-100 compliant IENC data. This document has been laid out, as far as possible, along the lines of the IHO publication S-4, Part B "Chart Specifications of the IHO – Medium and Large-Scale National and International (INT) Charts".

The purpose of the Data Classification and Encoding Guide is to facilitate S-401 encoding to meet IEHG standards for the proper display of IENC in an Inland ECDIS or ECS. The document describes how to encode information that the cartographer considers relevant to an IENC. The content of an IENC is at the discretion of the producer provided that the conventions described within this document are followed.

The entire S-100 Standard is available at the following web site, <https://ihc.int/>. The S-401 IENC Product Specification is available at the following web sites, <https://registry.ihc.int> and <https://ienc.openecdis.org>.

1.1.1 Background

Based on the findings of the European transport R&D project INDRIS (Inland Navigation Demonstrator for River Information Services) and the German project ARGO in 2001, both the Danube and the Rhine Commissions adopted an Inland Electronic Chart Display and Information Systems (ECDIS) standard for Electronic Navigational Chart (ENC) data and system requirements for the Rhine and the Danube Rivers. In 2001, the Economic Commission for Europe of the United Nations (UN ECE) adopted the Inland ECDIS Standard as a recommendation for the European inland waterway system (CCNR 2002).

In the USA, following a 1999 recommendation by the National Transportation Safety Board, the U.S. Army Corps of Engineers (USACE) initiated a program to facilitate the production and implementation of Inland ENCs on major river and inland waterway systems in the United States.

While there are some differences between the North American and European inland waterways, there are far more similarities. A North American - European Inland ENC Workshop was held in 2003 in conjunction with a Conference on River Information Services (RIS) organized by the European R&D-project COMPRIS (Consortium Operational Management Platform River Information Services). In addition to informing participants on the status of standards development and projects being conducted, a key objective was to discuss the benefits of harmonizing Inland ENC data standards between Europe and North America.

The North American - European Inland ENC Harmonization Group (IEHG) was formed in 2003 to facilitate the development of international standards for Inland ENC data. The IEHG is comprised of representatives from government, industry and academia. European participants take part on behalf of the European Inland ECDIS Expert Group. The North American participants are members of the North American Inland ENC Ad Hoc working group that was formed in 2002. The IEHG meets once per year. However, most of the work is accomplished via e-mail correspondence, the website <https://ienc.openecdis.org> and the Inland ENC discussion forum <https://wss.apan.org/army/iehg/>.

The goal of the IEHG is to agree upon specifications for Inland ENCs that are suitable for all known inland ENC data requirements for safe and efficient navigation for European and North American inland waterways. However, it is intended that this standard meets the basic needs for Inland ENC applications, worldwide. As such, the Inland ENC standard is flexible enough to accommodate additional inland waterway requirements in other regions of the world.

In September 2005, the Ministry of Transport of the Russian Federation became a member of the IEHG. In 2007, Brazil through its national Hydrographic Service, the Directorate of Hydrography and Navigation (DHN), joined the IEHG as the first South American country. In October 2009, the Waterborne Transportation Institute of the Ministry of Transport, Peoples Republic of China became the first member of the IEHG from the Asian region.

IEHG also works closely with the International Hydrographic Organization (IHO). At the ECDIS stakeholders' forum in 2007, IHO confirmed that compatibility with Inland ENC standards is allowed by the standards that are certified for maritime ECDIS applications. On 14 April 2009, IEHG became recognized as a Non-Governmental International Organization (NGIO) of IHO. In addition, at the 4th

Extraordinary International Hydrographic Conference on 4 June 2009, IHO adopted a resolution to cooperate with the IEHG.

As an NGIO, IEHG supports, advises and provides input to IHO regarding Inland ENC matters.

1.2 S-401 Annex A; Data Classification and Encoding Guide - Metadata

Note: This information uniquely identifies this Annex to the Product Specification and provides information about its creation and maintenance.

Title: The Inland ENC Harmonization Group (IEHG) Inland Electronic Navigational Chart Product Specification, Annex A – Data Classification and Encoding Guide

Version: 1.2.0

Date: October 2025

Language: English

Classification: Unclassified

Contact: Inland ENC Harmonization Group (IEHG)
Core Group, see contact details at
<https://ienc.openecdis.org/terms-of-reference-and-list-of-members>

URL: <https://ienc.openecdis.org/>

Identifier: S-401 Annex A

Maintenance: Changes to S-401 Annex A; Data Classification and Encoding Guide are coordinated by the Inland ENC Harmonization Group (IEHG), and must be made available via <https://registry.ihc.int> and <https://ienc.openecdis.org>.

1.3 Terms, definitions and abbreviations

1.3.1 Terms and definitions

See S-401 Product Specification Main document, clause 1.3.2.

1.3.2 Abbreviations

ECDIS	Electronic Chart Display and Information System
ENC	Electronic Navigational Chart
GML	Geography Markup Language
GNSS	Global Navigation Satellite System
IHO	International Hydrographic Organization
IMO	International Maritime Organization
IEHG	Inland ENC Harmonization Group
IENC	Inland Electronic Navigational Chart
ISO	International Organization for Standardization
SOLAS	Safety of Life at Sea
S-57	IHO Transfer Standard for Digital Hydrographic Data
TIFF	Tagged Image File Format
URL	Universal Resource Locator

UTC	Coordinated Universal Time
XML	Extensible Markup Language

1.4 Use of language

Within this document:

“Must” indicates a mandatory requirement;

“Should” indicates an optional requirement, that is the recommended process to be followed, but is not mandatory;

“May” means “allowed to” or “could possibly”, and is not mandatory.

1.5 Maintenance

Changes to the Data Classification and Encoding Guide must occur in accordance with the S-401 Inland ENC Product Specification clause 1.6.

2 General

The S-401 Data Classification and Encoding Guide describes how data describing the real world should be captured using the types defined in the S-401 Feature Catalogue (see S-401 Product Specification Main document clause 4.3). It provides the encoding rules and guidance required to create S-401 ENCs. This standard is specifically concerned with those entities in the real world that are of relevance to hydrography. This hydrographic regime is considered to be geo-spatial. As a result, the model defines real-world entities as a combination of descriptive and spatial characteristics. Within the model these sets of characteristics are defined in terms of feature, spatial and information types. A type is defined as a stereotype of class that is used to specify a domain of instances (features) together with the operations applicable to the features. A type may have attributes and may be related to other types.

The types used within S-401 are described below. Within this document feature types, information types, associations and attributes appear in **bold** text.

2.1 Feature types

Feature types contain descriptive attributes and do not contain any geometry (that is, information about the shape and position of a real-world entity).

Features have two aspects – feature type and feature instance. A feature type is a class and is defined in a Feature Catalogue. A feature instance is a single occurrence of the feature type and represented as an object in a dataset. A feature instance is located by a relationship to one or more spatial instances. A feature instance may exist without referencing a spatial instance.

S-401 makes use of the following feature types:

Geographic (Geo) feature type – carries the descriptive characteristics of a real-world entity.

Cartographic feature type – contains information about the cartographic representation (including text) of real-world entities.

Meta feature type – contains information about other features. Information defined by Meta features override the default metadata values defined by the dataset descriptive records. Meta attribution on individual geographic feature instances overrides attribution on Meta features.

2.1.1 Multiple features

On some sources, multiple features in close proximity are generalised to a single feature with a text string indicating the presence of the other features. In such cases, where it is considered that this

information may be useful for visual navigation, one feature of the appropriate class should be encoded and the true number of features, if known, must be encoded using the complex attribute **multiplicity of features**, sub-attribute **number of features**, with Boolean sub-attribute **multiplicity known** set to *True* (see clause 27.182). If the true number of features is not known, **multiplicity of features** Boolean sub-attribute **multiplicity known** must be populated as *False*. If **multiplicity of features** is not an allowable attribute for the feature, multiplicity may be indicated using the complex attribute **information**, sub-attribute **text** (for example 3 trees). If the true number of features is not known, the text "more than one" should be encoded using **information (text)**.

Multiple submerged features in close proximity, which have been generalised to a single feature, should not have the multiplicity indicated unless the multiplicity has some significance to safe navigation. This is so as to minimise the presence of Inland ECDIS or ECS "information" symbols, which may contribute to screen clutter (see clause 2.4.6).

For the encoding of multiple, identical lights using the complex attribute **multiplicity of features**, see Table 19-2 in clause 19.1.7.

For the encoding of leading lights that are required to be merged due to scale, see clause 19.1.5.

There is no method within IENC to indicate to the boatmaster that a feature has not been encoded in its true position, therefore it is considered important for features to be encoded in their true position to provide the boatmaster with an accurate representation of the real world.

Encoders are advised, therefore, that if it is required to encode a feature which has been displaced on the source, it should be captured in its real-world position on the IENC.

2.2 Information types

An information type is an identifiable object that can be associated with features in order to carry information particular to the associated features. An example of the use of an information type may be the requirement to include a note about overhead cables. Information types can also be associated with other information types. This may be done where there is further supplementary information that is relevant to the information type.

Information types carry attributes but not geometry.

In IENCs information types are used to code navigationally significant information about the feature that cannot be coded by attributes.

2.3 Geometric primitives

The allowable geometric primitive for each feature type is defined in the Feature Catalogue. Within this document, allowable primitives are included in the tables containing a description of each feature type. Allowable geometric primitives are point, pointset, curve and surface.

Each spatial value must be referenced by at least one feature instance.

Within this document, allowable primitives are included in the description of each feature type. A feature that may have no geometric primitive is annotated as no geometry (N).

2.3.1 Capture density guideline

It is recommended that curves and surface boundaries should not be encoded at a point density greater than 0.3 mm at the optimum display scale for the IENC data.

A curve consists of one or more curve segments. Each curve segment is defined as a loxodromic line on WGS84. Long lines may need to have additional coordinates inserted to cater for the effects of projection change.

The presentation of line styles may be affected by curve length. Therefore, the encoder must be aware that splitting a curve into numerous small curves may result in poor symbolization.

2.4 Attributes

Attributes may be simple type or complex type, and are described in Sections 27-30. Complex (C) attributes (Section 29) are aggregates of other attributes that can be simple type (Sections 27 and 28) or complex type. Simple attributes in S-401 are assigned to one of 9 types (see clause 2.4.2).

The binding of attributes to feature types; the binding of attributes to attributes to construct complex attributes; and attribute multiplicity is defined in the Feature Catalogue. Within this document, the allowable attributes are included in the description of each feature type, as well as attribute multiplicity and the allowable values for enumeration type attributes. Where relevant, constraints for other attribute types such as value range for integer and real type attributes; and string format and maximum string length for text type attributes as defined in the Feature Catalogue are also described.

2.4.1 Multiplicity

In order to control the number of allowed attribute values; or sub-attribute instances within a complex, S-100 uses the concept of multiplicity. This defines lower and upper limits for the number of values, whether the order of the instances has meaning and if an attribute is mandatory or not. Common examples are shown in Table 2-2 below:

Format : *MinOccurs, MaxOccurs (if * Infinite) (ordered)* – sequential

Multiplicity	Explanation
0,1	An instance is not mandatory; there can be only one instance.
1,1	An instance is mandatory and there must only be one instance.
0,*	An instance is not mandatory and there can be an infinite number of instances.
1,*	An instance is mandatory and there can be an infinite number of instances.
1,* (ordered)	An instance is mandatory and there can be an infinite number of instances, the order of which has a specific meaning.
2,2	Two instances are mandatory and no more than two.

Table 2-2 - Multiplicity - Examples

Note: The function of the S-57 based attribute type “List” has been replaced by Enumeration (EN) with an upper limit of multiplicity greater than 1. This means that when more than one value is needed for an enumeration type attribute, the attribute code is populated multiple times with the required values.

Example: A red and white tower is encoded with attribute **colour** = 3 (red) and **colour** = 1 (white). Within this document, this example would be indicated as “**colour** = 3,1”.

2.4.2 Simple attribute types

Each simple attribute in S-401 is assigned to one of 9 types:

- EN Enumeration: A fixed list of valid identifiers of named literal values. Attributes of an enumeration type may only take values from this list. The complete list of allowable values for S-401 enumeration type attributes is included in Sections 27, 28 and 30; these values may be further constrained for the binding of the attribute to specific feature and information types.
- BO Boolean: A value representing binary logic. The value can be either (1) *True*, (0) *False* or empty (*Unknown*). The “default state” for Boolean type attributes, unless stated otherwise in this document, is *False* for instances where the attribute is allowable for a feature, is non-mandatory and has not been populated (and is therefore not included for the feature instance). An empty (*Unknown*) value should only be populated where the Boolean type attribute is mandatory but the value (*True* or *False*) is not known to the encoder.
- RE Real: A signed Real (floating point) number consisting of a mantissa and an exponent. The representation of a real is encapsulation and usage dependent.

In S-100, “precision”, as it applies to the IHO GI Registry and the S-401 Feature Catalogue, is defined as a non-negative integer expressing the constraint of the exponent of a real number (that is, “1” means the real number is constrained to a precision of 0.1; “2” means the real number is constrained to a precision of 0.01; etc) (S-100 Part 2a, clause 2a-4.2.10). For the attribute descriptions included in Sections 27, 28 and 30 of this document, the values quoted for precision are expressed in more “human-readable” terms as the exponent of the real type attribute (0.1, 0.01, 0.001, ...).

Examples: 23.501, -0.0001234, -23.0, 3.141296

The maximum number of decimals of numeric attributes is defined in the Feature Catalogue (e.g. XX.dd for maximum two decimals). The encoding of numeric attributes (e.g. of depth information and heights of structures) should reflect the accuracy of the number. For example a bridge height of thirty-five meters, accurate to one meter, has to be encoded as 35, not as 35.0 or 35.00. Measured values without safety margins should be used.

IN Integer: A signed integer number. The representation of an integer is encapsulation and usage dependent.

Examples: 29, -65547

TE Text: A CharacterString, that is an arbitrary-length sequence of characters including accents and special characters from a repertoire of one of the adopted character sets.

TD Truncated Date (S100_TrimmedDate): Allows a partial date to be encoded as an extension to the ISO 8601 compliant date attribute type values for year, month and day according to the Gregorian Calendar. Character encoding of a date is a string which follows the calendar date format (complete representation, basic format) for date specified by ISO 8601. See clause [2.4.8](#).

Example: 19610922 (YYYYMMDD)

TI Time: A time is given by an hour, minute and second in the 24-hour clock system. Character encoding of a time shall be a complete representation of the basic format as defined in ISO 8601. Complete representation means that hours, minutes and seconds shall be used. Basic format means that separating characters are omitted.

Time may be expressed as Universal Time Coordinated (UTC).

Example: 183059Z

Time is preferably expressed as a Local Time with a given offset to UTC.

Example: 183059+0100

Time may be expressed as a Local Time without a specified offset to UTC.

Example: 183059

The complete representation of the time of 27 minutes and 46 seconds past 15 hours locally in Geneva (in winter one hour ahead of UTC), and in New York (in winter five hours behind UTC), together with the indication of the difference between the time scale of local time and UTC, are used below as examples.

Geneva: 152746+0100

New York: 152746-0500

The service hours for a service, that is available all year in an area where Daylight Saving Hour affects the offset to UTC, could be expressed as Local Time without specified offset.

Example: Opening: 074500 Closing: 161500

URI Universal Resource Identifier: A derivation of CharacterString. URI is a uniform resource identifier as defined in RFC 3986. Character encoding of a URI must follow the syntax rules defined in RFC 3986.

For S-401, the attribute type URI is constrained to conformance with the HTTP or HTTPS protocols; that is, the character string must commence with *http://* or *https://*.

Example: <https://registry.oho.int>

URN Universal Resource Name: A derivation of the CharacterString predefined derived type Universal Resource Identifier (URI). URN allows a persistent, location-independent, resource identifier to be encoded that follows the syntax and semantics for URNs specified in RFC 2141.

For S-401, the attribute type URN is used mainly to define Maritime Resource Names (MRN), typically in the IEHG namespace – *urn:mrn:iehg:....*.

Example: urn:mrn:iehg:uuid:123e4567-e89b-12d3-a456-426614174000

Real or integer attribute values must not be padded by non-significant zeroes. For example, for a signal period of 2.5 seconds, the value populated for the attribute **signal period** must be 2.5 and not 02.50.

NOTE: For real values between -1.0 and 1.0, the mantissa component zero is considered to be significant. For example, **0.01**; **-0.999**.

2.4.3 Mandatory and conditional attributes

Some attributes are mandatory and must be populated for a given feature type. The following are reasons why attribute values may be considered mandatory:

- They are required to support correct portrayal by determining
 - whether a feature is in the display base
 - which symbol is to be displayed;
- Certain features make no logical sense without specific attributes; and
- Some attributes are required for safety of navigation.

In Table 2-3 below, mandatory attributes for which this is relevant for a feature (that is, the attribute should not be populated with an empty (null) value) are indicated by the superscript *

Within this document, mandatory attributes (multiplicity 1,1; 1,n (n>1); or 1,*) are identified in the description of each feature type.

NOTE 1: Sub-attributes of complex attributes, as well as the complex attribute itself, may also be designated as mandatory (see NOTE 2 below). "Conditional" mandatory attributes are identified in the feature Tables in Sections 3-24 by the superscript †, with qualifying comments included after the attribute list for the relevant feature.

Compilers must consider these conditional circumstances when encoding features for IENC, as well as any additional information given in the feature class descriptions in this document. For example, when encoding a **Caution Area**, the mandatory attributes are *at least one of information or pictorial representation* – if the relevant information is textual, **information** must be populated and there is no requirement to populate **pictorial representation**, which therefore should not be populated with an empty (null) value, as it is not mandatory in this case.

NOTE 2: For complex attributes, at least one sub-attribute is mandatory (or conditionally mandatory). Where the sub-attribute of a complex is conditionally mandatory (for example, for the feature **Seabed Area** *at least one of the sub-attributes nature of surface or nature of surface – qualifying terms* must be populated for the complex attribute **surface characteristics**), this is indicated by the superscript † as for the "Conditional" mandatory attributes described in Note 1 above.

NOTE 3: The attribute **colour pattern** is mandatory for any feature (except lights features) that has more than one value populated for the attribute **colour**.

NOTE 4: The Inland ECDIS or ECS "system" attribute **default clearance depth** must be populated with a value, which must not be an empty (null) value, if the attribute **value of sounding** is populated with an empty (null) value (see clause 30.1).

Optional attributes should be encoded if the value is known.

2.4.4 Missing attribute values

Where a value of a mandatory attribute is not known, the attribute must be populated with an empty (null) value (however, see first paragraph of clause 2.4.3 above).

Where the value of a non-mandatory attribute is not known, the attribute should not be included in the dataset.

In a base dataset, when an attribute code is present but the attribute value is missing, it means that the Producer wishes to indicate that this attribute value is unknown.

In an Update dataset, when an attribute code is present but the attribute value is missing it means:

- that the value of this attribute is to be replaced by an empty (null) value if it was present in the original dataset, or
- that an empty (null) value is to be inserted if the attribute was not present in the original dataset.

2.4.5 Portrayal feature attributes

The primary use of IENC is within Inland ECDIS or ECS where IENC data is displayed based on the rules defined within the S-401 Portrayal Catalogue. While most Inland ECDIS or ECS portrayal is based on attributes describing the instance of a particular feature in the real world, certain feature attributes are used in portrayal rules to provide additional functionality in the Inland ECDIS or ECS or information to the boatmaster. The following attributes have specific influence on portrayal:

drawing index – population of this attribute may assist with the identification of a set of S-401 datasets that are intended to form a seamless presentation, regardless of scale; and identify a hierarchy of such seamless presentations (see clause 3.5 and S-401 Main document clauses 4.6 and 4.7).

fixed date range; periodic date range – population of these complex attributes determines when the feature will be added (sub-attribute **date start**) and/or removed (sub-attribute **date end**) from the display in some Inland ECDIS or ECS display settings (see clause 2.4.8).

information – population of this complex attribute will result in the display of the magenta information symbol to highlight additional information to the user.

name usage – this sub-attribute determines the priority and level of display (full display or Pick Report only) where multiple instances of the complex attribute **feature name** are encoded for a single feature instance, based on boatmaster's selected Inland ECDIS or ECS display settings (see clause 2.5.8).

pictorial representation – population of this attribute will result in the display of the magenta information symbol to highlight additional information to the user.

scale minimum – value at which the feature will be removed from the display if application of scale minimum is enabled in the Inland ECDIS or ECS (see clause 2.5.9).

sector line length – population of this attribute will result in the sector lines and arc radius of the sector being extended by the defined length when the Inland ECDIS or ECS display is set to display default light sectors. See clause 19.3.1.

visual prominence – this attribute determines that visually conspicuous features are shown in black colour rather than brown.

2.4.5.1 ECDIS “system” (portrayal) attributes

Attributes designated as “ECDIS system” attributes are intended to provide information specific to aiding in portrayal of features in Inland ECDIS or ECS in certain circumstances; and should be automatically populated by the IENC production software as required. The population of these attributes are conditional dependant on individual encoding instances including the relationship between an encoded feature and the underlying Skin of the Earth feature(s); and resolution of conflicts in portrayal specific to collocated light features. These attributes are described in Section 30 of this document, and include:

default clearance depth (see clause 30.1) – this attribute is intended to provide a depth value to the Inland ECDIS or ECS to aid in the display of underwater hazards (**Obstruction**, **Underwater/Awash Rock**, **Wreck**) where the actual depth of the underwater hazard is unknown (attribute **value of sounding** populated with an empty (null) value. This value is algorithmically calculated by the production system as required, based on the underlying depth(s) as described in clause 30.1. For S-401 IENCs, **default clearance depth** must be populated with a value, which must not be an empty (null) value, if the attribute **value of sounding** is populated with an empty (null) value.

in the water (see clause 30.2) – this Boolean attribute provides an indication to the Inland ECDIS or ECS that features that are located in or over navigable water are to be included in the Inland ECDIS or ECS Base Display. This attribute is automatically populated by the IENC production software where a structure is located over an area of bathymetry (**Depth Area**, **Dredged Area**, **Unsurveyed Area**).

sector arc extension (see clause 30.3) – this Boolean attribute provides an indication that a distance beyond the default distance at which a light sector arc will be displayed is required where more than one sector light having overlapping sectors has been encoded. This attribute is automatically calculated

and populated as required by the IENC production software. Note that **sector arc extension** is not utilised where light sectors are displayed at the nominal range of the sectors.

surrounding depth (see clause 30.4) – this attribute defines a depth value for the area surrounding an underwater hazard to aid in the portrayal of isolated dangers in Inland ECDIS or ECS, and is based on the **depth range minimum value** for the surrounding **Depth Area(s)**. This attribute is automatically calculated and populated as required by the IENC production software. For an area feature covered by more than one **Depth Area**, the value of **surrounding depth** is determined as the depth range minimum value of the deeper of the **Depth Area** features covering the underwater hazard. For S-401 IENCs, **surrounding depth** must be populated with a value, which must not be an empty (null) value.

2.4.6 Textual information

The complex attribute **information** (see clause 29.10) contains information as text using the sub-attribute **text**, or the name of an IENC support file using the sub-attribute **file reference**, in English and, optionally, using multiple instances of **information** to encode the information in one or more additional languages; and where bound to the geo feature classes may be used to encode additional textual information specific to a single feature instance. General conventions for the population of **information** for a feature instance are as follows:

- Where required, only a single mandatory instance of **information** in English (mandatory sub-attribute **language** = **eng** or empty (null)) must be encoded.
- Further optional instances of **information** may also be encoded (sub-attribute **language** populated with the three-letter language code in conformance with ISO 639-2/T) in one or more languages.

The information type **Nautical Information** (see clause 24.4) should be used to encode additional textual information associated to a group of features; and if the information is specific to a single feature, the information should be encoded on the feature itself. The **Nautical Information** is associated to the relevant features using the association **Additional Information** (see clause 25.1).

The complex attribute **information** must not be used when it is possible to encode the information by means of any other attribute. Under certain Inland ECDIS or ECS display settings the “information” symbol will display when this attribute is populated. Therefore Producers should carefully consider use of this attribute as the symbol may contribute significantly to Inland ECDIS or ECS screen clutter.

Character strings contained in **information** sub-attribute **text** must be UTF-8 character encoding. **Information** should generally be used for short notes or to transfer information which cannot be encoded by other attributes, or to give more detailed information about a feature. Text populated in **text** must not exceed 300 characters.

The exchange language for textual information should be English. Languages other than English may be used as a supplementary option, for which **language** must be populated with an appropriate value to indicate the language. Generally this means, when a national language is used in the textual attributes, the English translation must also exist.

Remarks:

- For Guidance on encoding names of features, see clause 2.5.8.

2.4.7 Spatial attribute types

Spatial attribute types must contain referenced geometry and may be associated with spatial quality attributes. Each spatial attribute instance must be referenced by a feature instance or another spatial attribute instance.

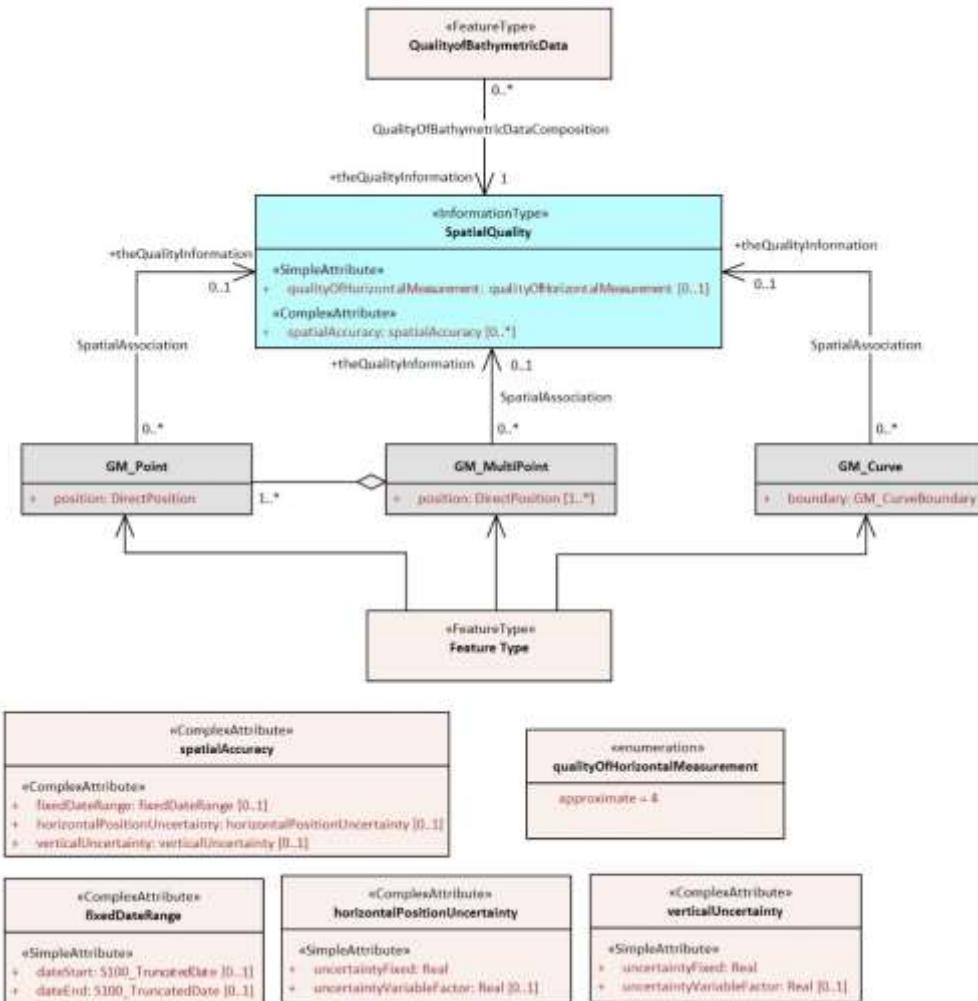


Figure 2-1 – Spatial Quality information type

Spatial quality attributes are carried in the information type **Spatial Quality** (see clause 24.5). Only point, multipoint and curve geometry and the Meta feature **Quality of Bathymetric Data** can be associated with **Spatial Quality**. Currently no use case for associating surfaces with spatial quality attributes is known, therefore this is prohibited; however it is allowable for **Spatial Quality** to be associated with the curves comprising the spatial edges (boundaries) of surface features. Vertical uncertainty is prohibited for curves as this dimension is not supported by curves.

2.4.8 Dates

When encoding dates using the attributes **dredged date**, **fixed date range**, **reported date**, **reference year for magnetic variation**, **survey date range** and **swept date**, the following values must apply in conformance to S-100.

- Full date: YYYYYMMDD
- No specific day required: YYYYMM--
- No specific month required: YYYY----

If it is required to encode periodic/recurring dates using the attributes **date fixed** and **periodic date range**, the following values must apply in conformance to S-100.

- No specific year required, same day each year: ----MMDD
- No specific year required, same month each year: ----MM--

Notes: YYYY = calendar year; MM = month; DD = day.

The dashes (-) indicating that the year, month or day is not needed must be included.

Encoded date ranges are inclusive, see S-100 Part 3, clause 3-8.3. For example:

fixed date range/date start = 20220922 Commences at 000000 hours on 22 September 2022
fixed date range/date end = 20221022 Ends at 240000 hours on 22 October 2022.

periodic date range/period start = ----09-- Commences annually at 000000 hours on 01 September.

periodic date range/date end = ----09-- Ends annually at 240000 hours on 30 September.

Where the temporal attributes have been encoded for any feature that is the structure component of a **Structure/Equipment** feature association (see clause 25.12), all other component features within the relationship must not extend beyond the temporal attribute values encoded for the structure feature.

Reported date (SORDAT)

US: **Reported date** (SORDAT) is a mandatory attribute and must be coded for all features in the IENC. **Reported date** (SORDAT) should be set to the release date of the chart if the actual source dates of the data unavailable.

EUR: **Reported date** (SORDAT) for other features it might be set to "unknown".

BR: **Reported date** (SORDAT) is optional.

2.4.8.1 Seasonal features

If it is required to show seasonality of features, it must be done using the attribute **status** = 5 (periodic/intermittent). If it is required to encode the start and/or end dates of the season, this must be done using the complex attribute **periodic date range** (see clauses 2.4.8 and 29.16).

Where there is a requirement to indicate the beginning or end date of a seasonal occurrence as the "last day in February", consideration must be given to allowing for the extra day (29th February) added on leap years. Encoding **periodic date range**, sub-attribute **date end** with the value ----0228 may result in erroneous indication of seasonality in the Inland ECDIS or ECS on the 29th February for leap years, while encoding the value ----0229 may similarly result in Inland ECDIS or ECS performance issues for non-leap years. Encoders are advised, therefore, that where it is required to encode the end of seasonality as the last day in February, this must be done, similar to any other month of the year, by encoding the value of **periodic date range**, sub-attribute **date end** as ----02--. Where the beginning of seasonality is the last day in February, this must be done by encoding the value of **periodic date range**, sub-attribute **date start** in accordance with the next occurrence of the date (----0228 if the next occurrence is a non-leap year or ----0229 if the next occurrence is a leap year). The IENC dataset must be amended by IENC Update (see Section 31) where the date is required to be changed. For instance, if the value is ----0228 and the next occurrence is a leap year, an IENC Update must be created to amend the date to ----0229.

Alternatively, if encoders consider that there is no regulatory requirement to update the start date of a period for leap years, the value of **date start** may be populated as ----03--, indicating a beginning date of 01 March each year.

2.4.9 Times

If it is required to show the beginning and end of the active time period of a feature, it must be encoded using the attributes **time of day end** (see clause 27.248) and **time of day start** (see clause 27.249). The attribute descriptions for **time of day end** and **time of day start** state that the format must conform to ISO 8601, and this format must be used (see also clause 2.4.2).

Time may be expressed as Universal Time Coordinated (UTC). Where required, this must be done using the format *hhmmssZ*, with 2 digits for the hour (*hh*), 2 digits for the minutes (*mm*) and 2 digits for the seconds (*ss*); and “*Z*” mandatory.

EXAMPLE: 183059Z to represent a UTC time of 30 minutes and 59 seconds after 6 o'clock in the evening

Time is preferably expressed in Local Time with a given offset to UTC. This must be done using the format *hhmmss+hhmm*.

EXAMPLE: 183059+0100 to represent a local time that is 1 hour ahead of UTC

In areas that are subject to daylight saving hours during certain periods of the year, it may be more appropriate to provide local times that are independent of a UTC offset. If it is required to express Local Time without a specified offset to UTC, this must be done using the format *hhmmss*.

EXAMPLE: 183059 to represent a local time of 30 minutes and 59 seconds after 6 o'clock in the evening

2.4.9.1 Schedules

If it is required to indicate the time schedule associated with any feature, it can be encoded using the information types **Service Hours** (see clause 24.2) or **Non-Standard Working Day** (see clause 24.3) especially if the information should be available for maritime vessels. **Service Hours** is used to indicate the regular operational schedule and/or times of closure for a service related to a feature. **Non-Standard Working Day** is used to indicate specific days of the year when normal working hours are limited, and may not be related to the Gregorian calendar.

EXAMPLE: A feature service is available under normal operation status 24 hours/day on Monday and Wednesday and from 08:00 to 16:00 (local time – note the format for local time with specified offset to UTC in clause 2.4.9 above) from Thursday to Saturday. The service is not available on public holidays and the 05 of August of each year.

Service Hours

schedule by day of week

category of schedule = 1 (normal operation)

time intervals by day of week

day of week = 2,4 (Monday, Wednesday)

day of week is range = 0 (false – indicates that **day of week** includes Monday and Wednesday only)

time intervals by day of week

day of week = 5,7 (Thursday, Saturday)

day of week is range = 1 (true – indicates that **day of week** includes the range of days Thursday, Friday and Saturday)

time of day start = 080000+0100

time of day end = 160000+0100

Non-Standard Working Day

date fixed = - - - -0805 (05 August each year)

date variable = *public holidays*

There can be different **Service Hours** for different **direction of impact**, **type of ship** or **use of ship** values.

2.4.10 Colours and colour patterns

If it is required to encode multiple colours on a feature, they must be encoded using the attributes **colour pattern** and **colour** as follows:

- For horizontal stripes (**colour pattern** = 1), the values for **colour** must be ordered such that the first colour is the top-most, and subsequent colours follow sequentially from top to bottom. For example, **colour** = 3,1 to encode a red stripe above a white stripe.
- For vertical stripes (**colour pattern** = 2), the values for **colour** must be ordered such that the first colour is the left-most, and subsequent colours follow sequentially from left to right. For example, **colour** = 3,1,3 to encode red, white, red vertical stripes

- For diagonal stripes (**colour pattern** = 3), the values for **colour** must be ordered such that the first colour is the top-left-most, and subsequent colours follow sequentially from top left to bottom right. For example, **colour** = 1,3,1,3,1 to encode white, red, white, red, white diagonal stripes.
- For squares (**colour pattern** = 4), the values for **colour** must be ordered such that the first colour is the top-left-most square. Subsequent colours follow sequentially from left to right along the top row then repeated for subsequent rows until the bottom right-most square is reached. For example, **colour** = 1,3,3,1 to encode white, red squares on the top row and red, white squares on the bottom row.
- For border stripes (**colour pattern** = 6), the values for **colour** must be ordered such that the first colour is the border stripe, and the second colour that of the background. For example, **colour** = 3,1 to encode a red border stripe on a white background. Where a border stripe is combined with other patterns, an assessment as to which pattern is most important to marine navigation must be made, and the appropriate value populated in **colour pattern**.

Note that the attribute **colour pattern** is mandatory for any feature (except lights) that has more than one colour.

If the encoded colours and colour pattern for feature is considered to be complex, it is strongly recommended that an image of the feature, if available, is also included using the attribute **pictorial representation**.

2.4.11 Radar conspicuous features

The Boolean attribute **radar conspicuous** is used to encode whether or not a feature is radar conspicuous.

Remarks:

- If it is required to encode a feature which has no radar reflector, but is radar conspicuous, it must be indicated using attribute **radar conspicuous** = *True*.
- If it is required to encode a surface or point feature which is radar conspicuous because it is fitted with a radar reflector, it must be indicated using attribute **radar conspicuous** = *True* on the feature where **radar conspicuous** is an allowable attribute. Where **radar conspicuous** is not an allowable attribute for the feature, a **Radar Reflector** feature (see clause 20.15) must be encoded within or coincident with the feature.
- If it is required to encode radar reflectors on curve features (for example overhead cables), this must be done using the feature **Radar Reflector**.

2.4.12 Attributes referencing IENC support files

The complex attribute **information** and its sub-attribute **file reference** on the information type **Nautical Information** (see clause 24.4) or on individual geo features references textual IENC support files. The simple attribute **pictorial representation** on **Nautical Information** or on individual geo features references picture files. The association **Additional Information** (see clause 25.1) is used to create an association between the geo feature(s) and **Nautical Information** where required. Where the information is relevant to a single feature instance only, it should be encoded using **information** or **pictorial representation** on the feature instance. Where the information is relevant to multiple feature instances, it should be encoded using **information** or **pictorial representation** on an associated instance of **Nautical Information**. See also clause 2.4.6.

The attributes **information** and **pictorial representation** are considered portrayal feature attributes (see clause 2.4.5), meaning that under given circumstances the “information” symbol (magenta “i”) will be portrayed in Inland ECDIS or ECS when one or both of these attributes are populated. Due to risk of Inland ECDIS or ECS screen clutter, Producers should carefully consider the use of these attributes.

These attributes must not be used when it is possible to encode the information by means of any other attribute.

Clause 11.2 of the S-401 Product Specification Main document specifies the content of an Exchange Set and the inclusion of support files. Clause 11.4 of the Product Specification Main document outlines specific rules and limitations for support files and their management; and additionally details IENC support file creation and application use cases

2.4.12.1 Reference to textual IENC support files

The IENC support files referenced by the complex attribute **information**, sub-attribute **file reference**, must be .TXT files, and may contain formatted text. These files should generally be used for longer texts (for example longer chart notes, tables or paragraphs from Nautical Publications), but should not be used to replicate large blocks of text (for example entire chapters of Sailing Directions) that can be found in other Nautical Publications, which may not be suitable for viewing in Inland ECDIS or ECS. It is up to the Producing Authority to determine the most suitable means of encoding a particular piece of text. Textual ENC support files must be encoded using the character set defined in ISO 10646-1, in Unicode Transformation Format-8 (UTF-8).

The exchange language for textual information should be English. The sub-attribute **language** must be populated with an appropriate value to indicate the language used. Languages other than English may be used as a supplementary option. Generally this means, when a national language is used in the textual attributes, the English translation must also exist.

Remarks:

- Encoders must encode national language IENC support files (files referenced by the sub-attribute **file reference**) using UTF-8 character encoding. This means that the encoding of the characters in these files must match the encoding of other textual national attributes (that is, **feature name**, **information (text)** with value other than English populated for sub-attribute **language**) within the dataset.
- Note that filename must be in UPPER CASE.

US: Format is AARRMMMXNN.EXT where:

AA = 2-character Producer Code

RR = 2-character river code

MMM = 3-digit river mile or river km, 000-999

X = tenth of river mile/km; preceding decimal point implied; use zero if river mile/km known only to the nearest mile.

NN = 01-99; unique identifier for text file at the particular river mile/km.

For example, if three TXTDSC files exist at the same river mile/km, 01, 02, and 03 would be used.

EXT = 3-character file extension for Hypertext Metafile (HTM), ASCII text (TXT), or Standardized External XML file with communication information.

EUR: The ISRS Location Code or the UUID (which can be part of the Maritime Resource Name (MRN)) can be used for the file name, e.g. DEXXX039000000005023.XML or 123e4567-e89b-12d3-a456-426614174000.XML.

2.4.12.2 Reference to pictorial IENC support files

The attribute **pictorial representation** should only be populated where the information is considered important in terms of safety of navigation and protection of the marine environment. Pictorial IENC support files that form part of the IENC must be in Tagged Image File (TIF) format 6.0 or JPG.

Encoders should also consider, when including a reference to a pictorial IENC support file, whether the file is appropriate in terms of:

- Size of the file: Pictorial files should be kept to a minimum file size, and should be considered in relation to the maximum allowable size of an IENC dataset (10Mb). Therefore, for example, a pictorial file of 100Mb should be considered to be inappropriate. Using the following values as a guideline for TIF files will ensure acceptable size pictorial IENC support files:

Recommended Resolution:	96 DPI
Minimum Size x,y:	200,200 pixels

Maximum Size x,y:	800,800 pixels
Bit Depth:	8 Bit Indexed Colour
Compression:	LZW
Format:	Tiff 6.0

Table 2-4 – Recommended formatting for TIF files used as IENC support files

- Content of the graphic: The information contained in the pictorial file should supplement, in terms of navigational relevance, the encoding of the associated feature. For example, an image of a standard IALA special purpose buoy that duplicates the attribution of the associated **Special Purpose/General Buoy** provides no relevant supplementary information to the boatmaster (and may be considered to be double encoding), and therefore should not be included.
- Aspect: Graphics should provide perspective relevant to the view of the boatmaster. For example, an image of the top of a bridge derived from a photograph taken from the top of a bridge tower or nearby building does not provide the boatmaster with any information relevant to their location, and should not be included. However, an image derived from a photograph taken from a vessel approaching the bridge may be considered relevant.
- Suitability for display in Inland ECDIS or ECS: Graphics should be such that all the information in the pictorial file is legible in the Inland ECDIS or ECS display. For example, text included in diagrams or tables must be large enough so as to be legible when the file is opened in the Inland ECDIS or ECS display. Images included in a pictorial file should also be appropriately scaled such that they comfortably fit in the picture display window on the Inland ECDIS or ECS (that is, do not only take up a very small area of the window; or are so large that the image needs to be panned to see the entire image). Consideration must also be given to variation in ships' bridge lighting conditions. It is recommended that, where possible, ENC support files are tested by opening the file in an Inland ECDIS or ECS prior to publication of the IENC.
- Note that the filename must be in UPPER CASE.

Format is AARRMMMXNN.EXT, where:

AA = 2-character Producer Code

RR = 2-character river code

MMM = 3-digit river mile or river km, 000-999

X = tenth of river mile/km; preceding decimal point implied; use zero if river mile/km known only to the nearest mile.

NN = 01-99; unique identifier for image file at the particular river mile/km.

For example, if three PICREP files exist at the same river mile/km, 01, 02, and 03 would be used.

EXT = 3-character file extension for the image file format; most commonly TIFF (TIF) or JPEG (JPG) formats.

2.4.13 UN Location Code

The attribute **UN location code** (UNLOCD) has been used to encode the UN Location Code (<http://www.unece.org/cefact/locode/service/main.htm>) or, in Europe, the Inland Ship Reporting Standard (ISRS) Location Code; which is used to establish a standardized relation to other River Information Services. It should only be encoded for new features if it is intended to publish Application Specific Messages (ASM) via Inland AIS for those features.

2.4.14 Interoperability Identifier

See inland specific encoding instructions in 27.161.

2.5 Datasets

A Dataset is a grouping of features, attributes, geometry and metadata which comprises a specific coverage.

Four types of IENC dataset may be produced and contained within an exchange set:

- Update: Changing some information in an existing dataset.
- Re-issue of a dataset: Including all the Updates applied to the original dataset up to the date of the reissue. A Re-issue does not contain any new information additional to that previously issued by Updates.
- New dataset and New Edition of a dataset: Including new information which has not been previously distributed by Updates. Each New Edition of a dataset must have the same name as the dataset that it replaces.

See also S-401 Main document, Section 4.5 in addition to the sub-clauses below for further information regarding IENC datasets.

2.5.1 IENC data coverage

An IENC dataset can contain more than one **Data Coverage** (see clause 3.5). The data boundary is defined by the extent of the **Data Coverage** Meta features. Data must only be present within **Data Coverage** Meta features.

Producers must not leave “holes” (that is, areas not covered with data) in smaller scale range coverage, under the assumption that the Inland ECDIS or ECS user will have the larger scale data available. For areas covered by larger scale IENCs, well established cartographic data generalization practices should be applied, including the inclusion of minimum depiction areas (see clause 2.5.3.2 below).

An IENC Update dataset must not change the extent of the data coverage for the base IENC cell. Where the extent of the data coverage for a base IENC cell is to be changed, this must be done by issuing a New Edition of the cell.

2.5.1.1 Skin of the Earth

Each area covered by a Meta feature **Data Coverage** must be totally covered by a set of geo features of geometric primitive type surface that do not overlap each other (the Skin of the Earth). Feature types that comprise the Skin of the Earth are listed below:

Depth Area

Dredged Area

Land Area

Unsurveyed Area

The geometry of coincident boundaries between Skin of the Earth features in a dataset must not be duplicated.

2.5.2 Discovery metadata

Information regarding discovery metadata can be found in the S-401 Inland ENC Product Specification (main document).

2.5.3 Minimal depiction areas

Where minimal depiction areas exist in a specified IENC optimum display scale, they should be encoded using one of the following options:

2.5.3.1 Wide blank areas

Areas of a dataset which contain no data must be excluded from the area(s) covered by the Meta feature **Data Coverage**. The areas that contain data must be completely covered by **Data Coverage** features.

2.5.3.2 Simplified or minimum depiction areas

- Bathymetry in such areas should be encoded as described in clause 11.7.2.
- Information that does not relate to bathymetry but is relevant to land area features may be encoded.
- One **Caution Area** feature covering the whole area should be created. The complex attributes **information** (sub-attribute **text** or **file reference**) should be encoded using one of the following options (the textual content of the attributes (for **file reference** this will be the contents of the referenced IENC support file) is within quotation marks and italicised):

Where larger scale coverage is available:

"Most features, including bathymetry, are omitted in this area. The minimal depiction of detail in this area does not support safe navigation; boatmasters should use a more appropriate scale IENC."

Any other relevant information pertaining to the area should be incorporated within, or replace completely, the above statement.

Where no larger scale coverage is available:

"Most features, including bathymetry, are omitted in this area. The minimal depiction of detail in this area does not support safe navigation."

This statement should be supplemented by additional cautionary information relating to any authority to be consulted before navigating in the area.

2.5.4 Units

The depth, height and positional uncertainty units in a dataset must be metres.

2.5.5 Seamless IENC coverage

IENCs should form a seamless coverage in the navigable waters of the Producer's area of responsibility. However, it is often impractical to do so for all Inland ECDIS or ECS display scales, and therefore S-401 IENCs declare a scale range, which dictate between what scales the data can be used.

The Meta feature **Data Coverage** (see clause 3.5) is used to provide the Inland ECDIS or ECS with the scale information necessary for the determination of dataset loading and unloading in relation to the user selected viewing scale in the Inland ECDIS or ECS.

The mandatory attribute **optimum display scale** is used to indicate the intended viewing scale for the data. This may be considered by the Data Producer to be the compilation scale for the data, and is also used as the reference for the overscale indication. The mandatory attribute **minimum display scale** is used to indicate the smallest intended viewing scale for the data. The mandatory attribute **maximum display scale** is used to indicate the value considered by the Data Producer to be the maximum (largest) scale at which the data is to be displayed before it can be considered to be "grossly overscaled".

An IENC dataset (discovery metadata) and associated **Data Coverage** feature(s) must carry a value for **optimum display scale**. Each **Data Coverage** feature must also carry a value for **maximum display scale** and **minimum display scale**. Values for **optimum display scale** and **minimum display scale** must be taken from the list of values defined in Table 3-2 at clause 3.5.1.

The **Data Coverage** features within a dataset must not overlap, however **Data Coverage** features from different datasets may overlap as long as the **optimum display scale** and **minimum display scale** ranges do not overlap and, if populated, they do not have the same value for the attribute **drawing index**. All **Data Coverage** features within a dataset must have the same value for **minimum display scale** and, if populated, **drawing index**, but portions of a dataset can have a different optimum and maximum display scale, depending on the best scale required for navigation in an area for the purpose of the IENC data.

Datasets that share a common minimum display scale will form a seamless presentation when rendered in the end-user system. When datasets do not share a common minimum display scale but are still intended to form a seamless presentation, this should be indicated by using a common drawing index.

Datasets with a common minimum display scale or drawing index must not contain overlapping data coverage features.

To ensure a seamless Inland ECDIS or ECS display of IENC data within the same scale range, it is important that the data on the border of the dataset is aligned and matched with the corresponding data in any adjoining datasets within the scale range, where possible. Where there is a mismatch in depth data between adjoining datasets, editing of the depth data should be done such that depth contours and depth areas are adjusted on the side of safety. Edge matching of data across different scale ranges, particularly depth data, is often not possible due to generalisation issues resulting from differing scales, although features such as maritime boundaries, navigation lines, recommended tracks, roads etc. should be edge matched where possible. Note that point or curve features which are at the border of **Data Coverage** features (see clause 3.5) for adjoining datasets with the same scale range must be part of only one dataset.

In areas which include neighbouring Producer Nations, producers should co-operate to agree on dataset boundaries and ensure no data overlap within scale ranges, or disparate drawing indices. Where datasets are intended to provide a seamless presentation at national boundaries and a common minimum display scale cannot be agreed, a common drawing index should be agreed. Where possible, adjoining nations should agree on common data boundaries within a technical arrangement based on cartographic convenience and benefit to the boatmaster. Suitable communications between neighbouring nations should be put in place to ensure data consistency across dataset boundaries. These should include exchange mechanisms to allow access to each other's IENCs.

2.5.6 Feature Object Identifiers

Each feature instance within an IENC must have a unique universal Feature Object Identifier [FOID]. Information regarding FOIDs can be found in clause 4.4 of the S-401 Inland ENC Product Specification (main document).

2.5.7 Heights and elevations

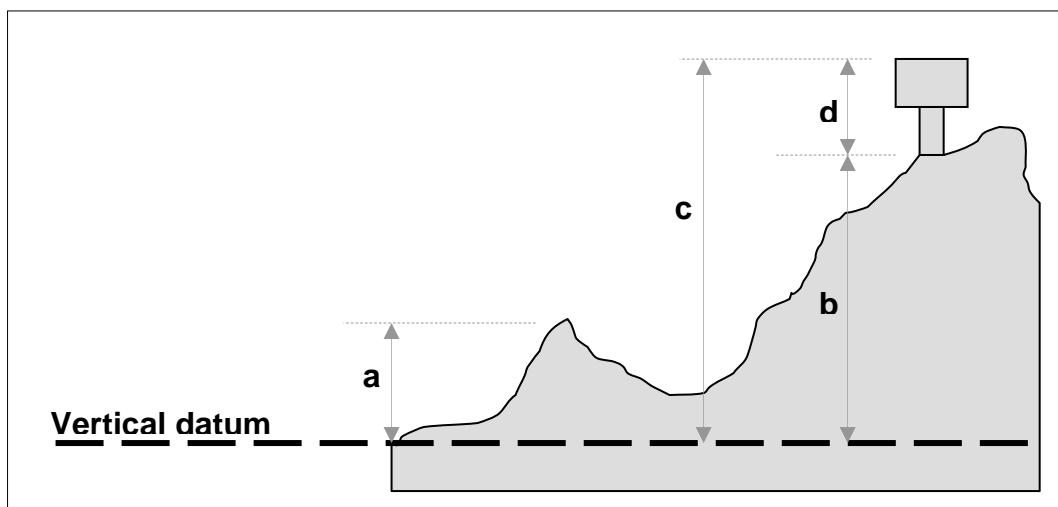


Figure 2-2 – Heights and elevations

If it is required to encode the altitude of natural features above a vertical datum (for example hills, coastlines, slopes), with the exception of trees, it must be done using the attribute **elevation** (Figure 2-2 (a)).

For artificial features (for example landmarks, buildings) or trees:

- If it is required to encode the altitude of the ground level at the base of the feature, or the elevation of a light, above a vertical datum, it must be done using **elevation** (Figure 2-2 (b)).
- If it is required to encode the altitude of the highest point of the feature above a vertical datum, it must be done using the attribute **height** (Figure 2-2 (c)).

- If it is required to encode the height of the feature above ground level, the seabed or (for floating features) the sea surface (that is, not associated with a vertical datum), it must be done using the attribute **vertical length** (Figure 2-2 (d)).

2.5.8 Geographic names

If it is required to encode a geographic name, or multiple versions of a geographic name including multiple language versions of the name, it must be done using one of more instances of the complex attribute **feature name** (see clause 29.3). When possible, existing features (for example **Built-Up Area**, **River**, navigational marks) should be used to carry this information.

If it is required to encode a geographic name for which there is no existing feature, a specific **Administration Area**, **Sea Area/Named Water Area** or **Land Region** feature must be created (see clauses 16.9, 9.1 and 5.8 respectively). In order to minimise the data volume, these features should, where possible, use the geometry of existing features, for example a **Sea Area/Named Water Area** feature may use the geometry of a **Depth Area** feature.

Geographic names can be left in their original language in a non-English iteration of the sub-attribute **name**, or transliterated or transcribed and used in an English iteration of the sub-attribute **name**, in which case the original name should be populated in an additional iteration of **feature name** with the mandatory sub-attribute **language** populated with the relevant three-letter language code in accordance with ISO 639-2/T. Examples of encoding of **feature name** are included in Table 2-5 below. General conventions for the population of **feature name** for an encoded feature instance are as follows:

- Where it is intended that a name of a feature instance is to be displayed in the Inland ECDIS or ECS, one or more iterations of **feature name** must be encoded for the feature, with exactly one of these instances having the sub-attribute **name usage** = 1 (default name display). This should normally be the English version of the name (mandatory attribute **language** = eng), however this is at the discretion of the Data Producer.
- Where only a single instance of **feature name** and having sub-attribute **name usage** = 1 is encoded for a feature instance, this name will be displayed in both the “default” Inland ECDIS or ECS language setting and the “alternate” Inland ECDIS or ECS language setting.
- Multiple instances of **feature name** may be encoded for any language, and/or for multiple languages. Where multiple instances of **feature name** are encoded for a feature instance, they must be encoded as follows in order to ensure the desired Inland ECDIS or ECS display in both the default and alternate Inland ECDIS or ECS language display settings:
 - If the name is intended to be displayed in the “default” Inland ECDIS or ECS display, exactly one instance of **feature name** having the sub-attribute **name usage** = 1 (default name display) must be included. Where other instances of **feature name** having the same value for the mandatory attribute **language** have been encoded, the attribute **name usage** must not be populated.
 - If an alternate language name is intended to be displayed in the “alternate” Inland ECDIS or ECS language setting, at least one instance of **feature name** having attribute **language** populated with a value other than the “default” language must be encoded, and having the value for the sub-attribute **name usage** = 2 (alternate name display). Only one **feature name** instance having **name usage** = 2 can be encoded for a single language; and for all **feature name** instances having an instance(s) of **name usage** = 2 there must be a feature instance having **name usage** = 1 encoded as the “default” language instance.
 - Where the language(s) selected by the boatmaster as the “alternate” language(s) is different from the alternate language(s) encoded for a feature instance, the “default” name will be displayed at all times.
 - If it is required to restrict the display of all instances of **feature name** encoded for a feature instance only to the Inland ECDIS or ECS Pick Report, **name usage** must not be populated for any instance.
 - All encoded instances of **feature name** will be included in the Inland ECDIS or ECS Pick Report.
- Reasons for encoding more than one instance of **feature name** for a particular language include (but are not limited to):
 - For cartographic reasons, for example to abbreviate a name using an international abbreviation.

- To allow an identifier/designator to be displayed in preference to the name of the feature (for example on aids to navigation).

In the following examples, a dash in the **name usage** sub-attribute column indicates that the sub-attribute must not be populated.

S-401 Feature: Sea Area/Named Water Area		
Complex attribute feature name, sub-attributes:		
name	language	name usage
Grolsch Point	eng	-
Grolsch Pt	eng	1
Hafen Grolsch	deu	-
Hn. Grolsch	deu	2
Port de Grolsch	fra	-
P. Grolsch	fra	2

Name displayed in Inland ECDIS or ECS (based on display of names enabled and boatmaster's selected language settings)	
Language setting	Name displayed
Default	Grolsch Pt
Alternate (German)	Hn. Grolsch
Alternate (French)	P. Grolsch
Alternate (Spanish)	Grolsch Pt
Alternate (English)	Grolsch Pt

S-401 Feature: Land Area		
Complex attribute feature name, sub-attributes:		
name	language	name usage
Baffin Island	eng	1
Île de Baffin	fra	2
Qikiqtaaluk	iku	2
ᓇᑦӄ	iku	-

Name displayed in Inland ECDIS or ECS (based on display of names enabled and boatmaster's selected language settings)	
Language setting	Name displayed
Default	Baffin Island
Alternate (French)	Île de Baffin
Alternate (Inuktitut)	Qikiqtaaluk
Alternate (Spanish)	Baffin Island

S-401 Feature: Built-Up Area		
Complex attribute feature name, sub-attributes:		
name	language	name usage
Inari	fin	1
Enare	swe	2
Aanaar	smn	2
Anár	sme	2
Aanar	sms	2

Name displayed in Inland ECDIS or ECS (based on display of names enabled and boatmaster's selected language settings)	
Language setting	Name displayed
Default	Inari
Alternate (Swedish)	Enare
Alternate (Inari Sami)	Aanaar
Alternate (Northern Sami)	Anár
Alternate (Skolt Sami)	Aanar

Table 2-5 – Complex attribute feature name encoding - examples

Geographic names should be encoded using **feature name** based on the following criteria and at the producers discretion:

1. Named points or capes that do not contain navigational aids should be encoded as **Land Region** features (of type surface or point), with the geographic name encoded using **feature name**.
2. Named points or capes that contain one navigational aid should be encoded using **feature name** on the structure feature associated with the navigational aid. If more than one navigational aid exists on the point or cape and the structure feature have different names, a **Land**

- Region** feature (of type surface or point) should be encoded, with the geographic name of the point or cape encoded using **feature name**.
3. A group of hydrographic features (for example **Seabed Area**, **Underwater/Awash Rock**, **Obstruction**, **Sounding**), associated with a particular geographic name, should have the name encoded using **feature name** on a **Sea Area/Named Water Area** feature (of type surface or point). The name should not be encoded on the individual hydrographic features.
 4. A major island name close to primary shipping corridors should be encoded using **feature name** on the **Land Area** feature delimiting the island.
 5. n.a.
 6. Named features listed in the communications of the navigation authorities that may assist in navigation should be encoded using **feature name** on the relevant feature (for example **Land Region**, **Underwater/Awash Rock**, **Seabed Area**, **Sea Area/Named Water Area**, **Obstruction**).
 7. If it is required to encode an administrative area of international, national, provincial or municipal jurisdiction that may have legal inference, it must be done using an **Administration Area** feature, with the name encoded using **feature name**.
 8. If it is required to encode a major city along the coast, it must be done using **Built-Up Area** or **Administration Area** features (see clause 6.1), with the name encoded using **feature name**.
 9. If it is required to encode the name of a navigable river, lake or canal, it must be done using a **Sea Area/Named Water Area** feature, with the name encoded using **feature name**.
 10. If it is required to encode the name of a beach and no intertidal area exists, it should be done using **feature name** for the section of sandy coast (**Coastline** with **nature of surface** = 4 (sand)) representing the beach. If the extent of the beach cannot be determined from the source, then the name should be encoded using **Land Region**. When an intertidal area (**Depth Area**) exists in the area covered by the named beach, the name of the beach should be encoded using **feature name** for a **Sea Area** feature covering the intertidal area.

In all instances, if the exact extent of the feature to be named is known, a surface feature must be created. If the exact extent is not known, or the area is too small at the optimum display scale of the IENC dataset, an existing or specifically encoded point feature should be used to encode the geographic name.

Do not include information on characteristics of a feature in the feature name. The name must be in Title Case. Abbreviations should be used where possible. Only short names should be used to avoid clutter in the display.

US: Any important navigation notes that should always be shown on the IENC should be encoded as **Land Region** (LNDRGN) (P) on land or **Sea Area** (SEAARE) (P) features in the water.

EUR: Use the appropriate feature to display information (e.g. **Communication Area** (comare)).

2.5.8.1 Text placement

The cartographic feature **Text Placement** (see clause 23.1) is used specifically to place text cartographically. The properties of the text placement feature are described as follows;

Geometry (point) – the spatial point location of the text string.

text type – the classification of the text being placed based on attribution of the target feature(s) (mandatory).

text offset bearing and **text offset distance** – the bearing and distance (in millimetres in the Inland ECDIS or ECS display) used to position the text relative to the feature.

The **Text Placement** feature is associated to the feature which carries the text being placed. The mandatory attribute **text type** identifies the text string(s) to be placed. The **Text Placement** feature may provide functionality such that, as an Inland ECDIS or ECS screen rotates from its optimum position in “head up” display mode (for example, if display is set to “north up”) text can remain readable, or clear other important charted information.

2.5.9 Sample scale minimum policy

The values for the scale minimum mentioned for the individual features are recommendations for European and American waterways. The chart producer might deviate from these values in order to improve the chart display in special situations, for example on very small or very large waterways. The value of **scale minimum** (SCAMIN) has to be set to a scale value smaller than or equal to the compilation scale of the data for the area.

For other IENCs the following policy for the application of **scale minimum** (see clause 27.218) to an IENC portfolio which is based on the mandatory **optimum display scale** values listed in clause 3.5.1 has to be taken into account. While the procedure described below to determine the **scale minimum** value for features in an IENC cell is recommended, the **scale minimum** values used are at the discretion of the producer. Producers should cooperate at the regional level to determine a **scale minimum** policy that results in suitable and consistent display of IENC data for the boatmaster across and, where required between, regions.

scale minimum values used should be selected from the following list if the values mentioned for the individual features and regions are not used:

Scale
NULL (only allowed on minimum display scale (data will continue to be displayed at all smaller scales))
1:10,000,000
1:3,500,000
1:1,500,000
1:700,000
1:350,000
1:180,000
1:90,000
1:45,000
1:22,000
1:12,000
1:8,000
1:4,000
1:3,000
1:2,000
1:1,000
1:500
1:200 (only allowed on optimum and maximum display scale)

Table 2-6 – scale minimum values

- **scale minimum** values for features within an IENC should be set to either 1, 2, 3 or 4 steps smaller scale than the optimum display scale of the IENC data.

Following this process provides an automated approach to setting **scale minimum** which takes account of the relative importance of different feature classes, and will achieve sufficient de-cluttering even where there are large gaps in the scales of coverage available.

This approach takes no direct account of the relative importance of individual occurrences of a feature, and may result in the situation where a feature disappears and then reappears as the user zooms out on their Inland ECDIS or ECS display. To address these remaining issues, the following additional process steps should be applied:

- Linear and area features (excluding those features subject to extensive generalisation for example **Depth Contour**) that extend beyond the coverage of a dataset and exist in an overlapping smaller

scale dataset should be assigned the same **scale minimum** value as the **scale minimum** value of the corresponding feature in the smaller scale dataset.

- The **scale minimum** value of an individual occurrence of a feature should be set to either 1, 2, 3 or 4 steps smaller scale than the optimum display scale of the smallest scale IENC that the feature would appear on (that is, assuming full coverage across all optimum display scale values).
- 1. It is generally accepted that features making up a navigational aid will have the same attributes, and therefore features within a **Structure/Equipment** association (see clause 25.12) should be assigned the same **scale minimum** value.
- 2. The elements comprising a range system (see clause **Fehler! Verweisquelle konnte nicht gefunden werden.**) should have the same **scale minimum** value, which should be the value corresponding to the largest step value of the features comprising the range system. For instance, for a range system comprising a **Navigation Line**, **Recommended Track** and navigation aids, the decision may be not to apply **scale minimum** to the navigation aids, in which case the **Navigation Line** and **Recommended Track** should also not have **scale minimum** applied. Similarly, all features comprising a routeing measure (see clause 10.2) should have the same **scale minimum** value.
- 3. Where features having curve or surface geometry extend over multiple **Data Coverage** areas (see clause 3.5), the value for **scale minimum** should be populated based on the largest scale denominator populated for the attribute **optimum display scale** on the underlying **Data Coverage** areas. The same approach should also be considered for items included in feature associations such as range systems and routeing measures, also taking into account Note 2 above.

2.5.10 Masking

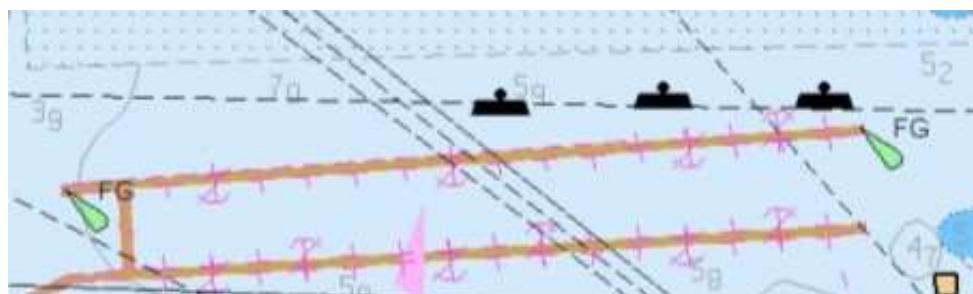


Figure 2-5 – Overwriting symbols – Example

To improve the look and feel of the display of IENCs in Inland ECDIS or ECS for the boatmaster certain edges of features should be masked (see S-401 Product Specification Main document clause 4.8.3). For example, the boundaries of anchorage area symbols overwrite coincident pontoon symbols:

In order to best determine the appropriate level of masking required for an IENC cell, it is recommended that the IENC be viewed in an Inland ECDIS or ECS.

The following scenarios where masking is recommended should be considered by compilers;

1. Surface features crossing IENC cell boundaries:

When a single feature of type surface crosses the boundaries of adjoining IENC cells, mask the edge where it shares the geometry of the boundary in each IENC:

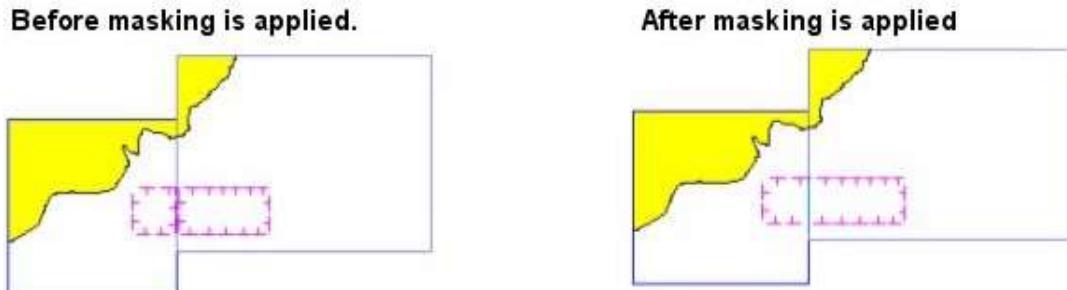


Figure 2-6 – Surface feature crossing IENC cell boundaries

This allows the features to be displayed as a single feature of type surface rather than being divided at the cell boundary and having the representation of two separate features. Note that some IENC production software will automatically truncate (mask) features at the cell boundary.

NOTE: Occasionally an edge of the boundary of an area actually coincides with the IENC cell boundary. Where this occurs and the IENC production system applies automatic truncation (masking) of this edge, the compiler must “unmask” that edge so as to avoid the appearance of the area to be “open ended”.

Where features of type surface extend beyond the entire limit of data coverage for the IENC cell (see clause 3.5), all edges of these area features should be masked:

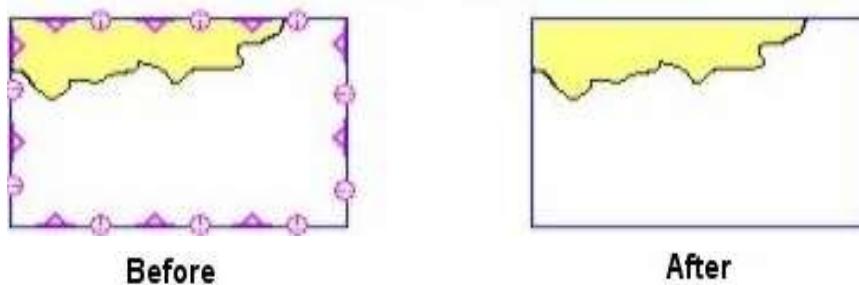


Figure 2-7 – Surface features extending beyond the entire limit of data coverage

Where a cell contains an area of no data coverage and the IENC production software applies automatic truncation (masking) of features extending beyond the limit of data coverage of the IENC, edges of area features extending beyond the internal limit of the area of no data coverage may need to be masked manually.

Table 2-9 below lists those features of type surface that should have edges masked where the boundary of the area crosses or extends beyond the IENC cell limit or the area of data coverage of the IENC cell.

Feature Type	Comment
Anchorage Area	
Berths	
Bunker Station	
Cable Area	
Cargo Transhipment Area	
Caution Area	Also edges that are shared with Traffic Separation Scheme (TSS)
Communication Area	
Dredged Area	
Dumping Ground	
Exceptional Navigation Structure	

Feature Type	Comment
Fishery Zone	
Harbour Area (Administrative)	
Harbour Basin	
Lock Basin Part	
Military Practice Area	
Offshore Production Area	
Pilotage District	When the whole cell falls within a pilotage area.
Pilot Boarding Place	
Port Area	
Precautionary Area	Not applied if it is within a TSS.
Quality of Bathymetric Data	
Quality of Survey	
Refuse Dump	
Restricted Area	
Sandwave	
Seaplane Landing Area	
Submarine Pipeline Area	
Terminal	
Turning Basin	
Vegetation	
Vehicle Transfer	
Vessel Traffic Service Area	
Water Turbulence	
Waterway Area	

Table 2-9 – Features requiring masking along data coverage limit edges

2. Surface features having Inland ECDIS or ECS symbol pattern fill:

Surfaces symbolised in Inland ECDIS or ECS with a patterned fill, and for which the outer edge of the surface has no significance (or is subject to change or intermittent), for example **Vegetation** (see Figure 2-8 below) or **Water Turbulence** features, may have the boundary of the surface masked to reduce screen clutter.

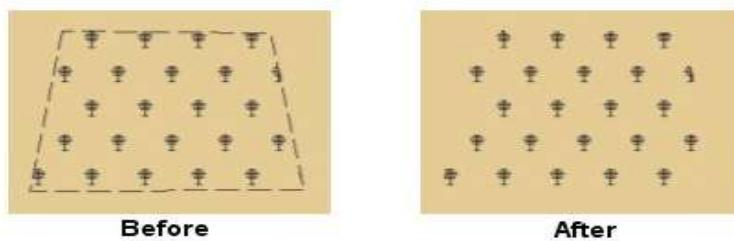


Figure 2-8 – Surface feature with pattern fill

Compilers must take care that the surface is large enough at the optimum display scale of the IENC data (and at smaller optimum display scales at which it is intended that the feature should be displayed) so that at least one pattern symbol is displayed in the area. If this is not the case, the boundary of the surface should not be masked. Alternatively, a point feature may be encoded instead of the surface feature. It may be useful to load and display the IENC in an Inland ECDIS or ECS in order to assist with making decisions as to the best encoding option to adopt in individual circumstances.

3. Routeing measures – entrance and exit edges:

Routeing measures such as Traffic Separation Schemes (TSS) and Two-Way Routes have defined “ends” through which vessels enter and exit the route. Most routeing measures also consist of multiple components having different orientations. Where encoded, many of the features comprising the routeing measure symbolise along the edges of the area. Where the edges corresponding to the entry/exit points and between individual components of the route have not been masked, the impression of the route as a single routeing measure may not be apparent to the Mariner, and cause confusion. Compilers should therefore mask the entry/exit edges, and all edges between components within the routeing measure.

Table 2-10 below lists those area features that should have entry/exit edges, and all edges between components within the routeing measure masked.

Feature Type	Comment
Fairway	
Inshore Traffic Zone	Only to be applied when the entrance and/or exit routes are known
Recommended Traffic Lane Part	
Traffic Separation Scheme lane Part	
Two-Way Route part	
Coverage	Coverage available, mask full coverage. (No Coverage available, don't mask)
Navigational System of Marks	Mask full coverage.

Table 2-10 – Features for masking of entry/exit points

Figure 2-9 below shows an example of a TSS with all appropriate edges of the components of the TSS masked.

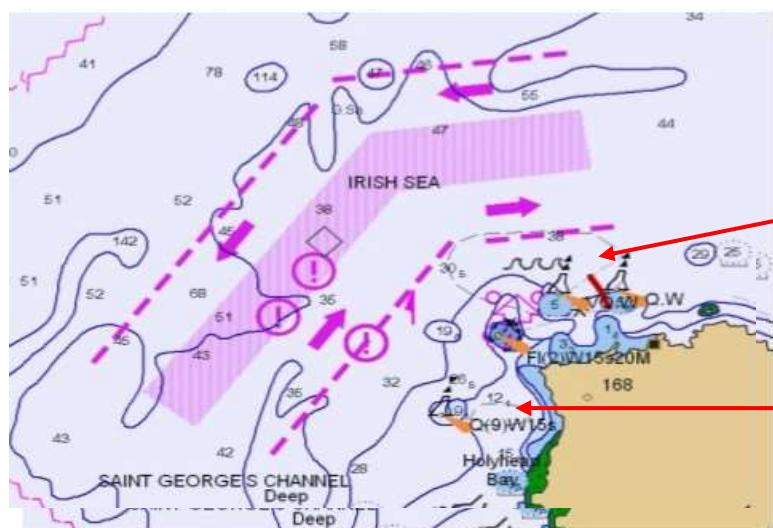


Figure 2-9 – Traffic Separation Scheme with appropriate masking

To give an indication of the effect of masking in a complex area such as an area containing a TSS, Figure 2-9 includes a **Caution Area** feature of type surface which has not had its edges masked. Due to the existence of the magenta “!” symbols within the **Caution Area**, and the fact that the edges of the **Caution Area** are coincident with the outer edge of the TSS, it is possible to further reduce Inland ECDIS or ECS display clutter by masking the edges of the **Caution Area**. The resultant Inland ECDIS or ECS display can be seen in Figure 2-10 below.

Figure 2-10 – Traffic Separation Scheme with masked Caution Area

NOTE: In the example above it is also possible to mask the areas of water turbulence (indicated in Figure 2-10 by red arrows – see scenario 2 above), however the small area to the east of the West cardinal buoy is too small to display the symbol at the optimum display scale of the IENC data. In cases such as this the compiler should consider capturing this as a **Water Turbulence** feature of type point.

2.5.11 Collection Features Extending Beyond Cell Boundaries

If a collection feature extends beyond a cell boundary (i.e. the features that make up the collection are spread over multiple cells), the collection feature should be repeated in each cell that contains one or more component features. However, only the features that exist in the cell that contains the instance of the collection feature can be referenced by that collection feature. If this technique is used, each instance of the original collection feature must have the same feature identifier (LNAM). It is up to the application (e.g. the Inland ECDIS or ECS) that uses the cells to rebuild the complete collection feature based on the unique feature identifier.

2.6 Description of table format for S-401 meta, geo and information features

X.X Clause heading

<p>IHO Definition: FEATURE: Definition. (Authority for definition).</p> <p>If there is a deviating definition for inland waterways, it is added here as a remark.</p>				
<p>S-401 Geo Feature: Feature (IENC Acronym) S-401 feature type, name and corresponding IENC acronym Indication whether the Feature is part of the minimum content ((M), (C) or (O))</p>				
<p>Primitives: Point, Curve, Surface, No Geometry Allowable geometric primitive(s)</p>				
Real World	Paper Chart Symbol	INLAND ECDIS OR ECS Symbol	Type	Multiplicity
Example(s) of real-world instance(s) of the Feature.	Example(s) of paper chart equivalent symbology for the Feature.	Example(s) of Inland ECDIS or ECS symbology for the Feature.		
S-401 Attribute	IENC Acronym	Allowable Encoding Value	Type	Multiplicity
category of beer		1 : ale 2 : lager 3 : porter 4 : stout 5 : pilsener 6 : bock beer 7 : wheat beer 8 : pale ale 9 : indian pale ale	EN	1,1
This section lists the full list of allowable attributes for the S-401 feature. Sub-attributes (Type prefix (S)) of complex (Type C) attributes are listed in alphabetical order and indented directly under the entry for the complex attribute (see below for example). Note that a complex attribute may have simple or complex attributes as sub-complex attributes. Attributes in <i>italics</i> are allowed, but not recommended for IENCs.		This section lists the corresponding IENC attribute acronym. A blank cell indicates no corresponding IENC acronym.	This section lists the allowable encoding values for S-401 (for enumeration (E) Type attributes only). Further information about the attribute is available in Sections 27-30.	Attribute type (see clause 2.4.2). Multiplicity describes the “cardinality” of the attribute in regard to the feature. See clause 2.4.1.
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 [†]
pictorial representation	(PICREP)	See clause 2.4.12.2	TE	0,1
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity

Role name	Name of Association (see clause 25.xx)	Feature or Information Type(s)	Association/Aggregation/Composition	0,1
See Section 26.	See Section 25.	Corresponds to the feature(s) that the subject feature may be associated to. See Section 25	Association type.	The individual multiplicity to which the subject feature may be associated to the "Associated to" feature(s) (see clause 25).

^t For each instance of fixed date range, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

The "^t" superscript in the Multiplicity column indicates a "conditional" mandatory attribute. See clause 2.4.3.

X.X.X Sub-clause heading(s)

Introductory remarks. Includes information regarding the real world entity/situation requiring the encoding of the Feature in the IENC, and where required nautical cartographic principles relevant to the Feature to aid the compiler in determining encoding requirements.

Specific instructions to encode the feature.

Note that in all sub-clauses feature types and association names are shown in **Bold Capitalised Text**; attributes (complex, sub- and simple) are shown in **bold lower case text**; and attribute values (including enumerate codes) are shown in *italic text*.

Remarks:

- Additional encoding guidance relevant to the feature.

X.X.X.X Sub-sub-clause heading(s)

Clauses related to specific encoding scenarios for the Feature. (Not required for all Features).

Remarks:

Additional encoding guidance relevant to the scenario (only if required).

Distinction: List of features in the Product Specification distinct from the Feature.

Inland specific Encoding Instructions:

- A) inland specific encoding instructions in addition to the instructions copied from S-101 above

Remarks:

- S-401 Attribute: Indentation of attributes indicates sub-attributes of complex attributes. Complex attributes may also be sub-attributes of complex attributes, which is indicated by further indentation of the attribute name in the tables.
- S-401 Attribute: Attributes shown in grey text are ECDIS "system" attributes which are populated by the IENC production system in order to assist with portrayal of IENC data in Inland ECDIS or ECS (see Section 30). These attributes may be further edited by the compiler as required.
- IENC Acronym: IENC attribute acronyms shown in italic style text have been re-modelled in S-401 from IENC.

- Allowable Encoding Value: For enumeration (EN) type attributes, the enumerate values listed are only those allowable for the particular binding of the attribute relevant to the feature. Allowable values may vary for the attribute depending on the feature to which the attribute is bound. Such bindings are defined in the S-401 Feature Catalogue. The full list of enumerate values that may be assigned to an attribute in S-401 can be found in Sections 27 and 28 of this document.
- Type: The prefix (C) indicates that the attribute is a complex attribute. Complex attributes are aggregates of other attributes that can be simple type or complex type. The prefix (S) indicates that the attribute is a sub-attribute of a complex attribute. Complex attributes that are sub-attributes of a complex attribute, and their sub-attributes, are indicated by indentation of the attribute name in the S-401 Attribute column.
- Feature/Feature, Feature/Information and Spatial/Information associations, including allowable features for association ends, are described in Section 25.

2.7 Inland specific General Guidance

2.7.1 Minimum content of an IENC

Each feature has been classified for encoding purposes as mandatory, conditional or optional.

- Mandatory (M) features must be encoded.
- Conditional (C) features are mandatory (must be encoded) if defined conditions are met. If the defined conditions are not met, the features are Optional (O).
- Optional (O) features should be encoded if the value is known.

2.7.2 Source Indication

See inland specific encoding instructions in 29.28.

2.7.3 Numeric precision

The maximum number of decimals of numeric attributes is defined for each attribute (e.g. XX.dd for maximum two decimals). The encoding of numeric attributes (e.g. of depth information and heights of structures) should reflect the accuracy of the number. For example a bridge height of thirty-five meters, accurate to one meter, has to be encoded as 35, not as 35.0 or 35.00. Measured values without safety margins should be used.

2.7.4 Assigning approximate positions

To assign an approximate position ('PA') for charted features, the attribute **quality of horizontal measurement (QUAPOS) = 4 (approximate)** is assigned to the appropriate spatial type (point or curve). It is not assigned to the feature (e.g. **Wreck (WRECKS)** feature), but to the spatial reference for the feature. When correctly coded, the electronic chart system will display 'PA' adjacent to the feature.

2.7.5 Legal ECDIS

Category attributes for ship types, ship formations and cargo type are available. These categories are used to describe for which type of ship, convoy, or cargo the particular regulation is valid. There are two ways of describing which categories are affected by the rule:

1. explicit selection
2. implicit selection

The attributes for explicit type selection are used to explicitly select the types from the given list. The attributes for implicit type selection are used to select those types that are not affected.

It is up to the encoder if the explicit attribute or its implicit version is used. However, it is not allowed to use both attributes when defining the category of a law content feature.

One would make use of implicit type selection if for example the respective regulation states which types are excluded from the regulation rather than explicitly listing those types that are affected.

Example: “recreational crafts are excluded from a speed limit.”

2.7.6 Collection features extending beyond cell boundaries

If a collection feature extends beyond a cell boundary (i.e. the features that make up the collection are spread over multiple cells), the collection feature should be repeated in each cell that contains one or more component features. However, only the features that exist in the cell that contains the instance of the collection feature can be referenced by that collection feature. If this technique is used, each instance of the original collection feature must have the same feature identifier (LNAM). It is up to the application (e.g. the Inland ECDIS or ECS) that uses the cells to rebuild the complete collection feature based on the unique feature identifier.

3 Metadata Features

The maximum use must be made of Meta features to reduce the attribution on individual features. In a Base dataset (see S-401 Annex B, clause B5), some Meta features are mandatory.

These mandatory Meta features are in the following list:

Data Coverage: In order to assist in data discovery, the Meta feature **Data Coverage** must be used to provide coverage of the part of the dataset covered by Skin of the Earth features. See clause 3.5.

Navigational System of Marks: The Meta feature **Navigational System of Marks** must provide an exhaustive non-overlapping coverage of the **Data Coverage** feature(s). See clause 3.6.

Quality of Bathymetric Data: The Meta feature **Quality of Bathymetric Data** defines areas within which uniform assessment exists for the quality of bathymetric data, and is used to provide an assessment of the overall quality of bathymetric data to the Mariner. Areas of a dataset at optimum display scale 1:700000 and larger containing depth data or bathymetry must be covered by one or more **Quality of Bathymetric Data** features, which may overlap vertically (see clause 3.8.1). At optimum display scales smaller than 1:700000, **Quality of Bathymetric Data** features are optional.

NOTE: Where a dataset does not contain any depth data or bathymetry, it is not required to encode **Quality of Bathymetric Data**.

Sounding Datum: The Meta feature **Sounding Datum** must provide an exhaustive non-overlapping coverage of the **Quality of Bathymetric Data** feature(s). See clause 3.9.

NOTE: Where a dataset does not contain any depth data or bathymetry, it is not required to encode **Sounding Datum**.

Vertical Datum of Data: The Meta feature **Vertical Datum of Data** must provide an exhaustive non-overlapping coverage of the **Data Coverage** feature(s). See clause 3.10.

3.1 Horizontal uncertainty

The attributes **quality of horizontal measurement** and **horizontal position uncertainty** may be applied to any spatial type, in order to qualify the location of a feature.

If it is required to encode the uncertainty of a horizontal clearance (complex attributes **horizontal clearance fixed** and **horizontal clearance open**), it must be done using the sub-attribute **horizontal distance uncertainty**.

horizontal distance uncertainty applies only to **horizontal clearance fixed** and **horizontal clearance open**. There is no attribute to express the accuracy of the attributes **horizontal length** and **horizontal width**.

horizontal distance uncertainty and **quality of horizontal measurement** must not be applied to the spatial type of any geo feature if they are identical to the **horizontal distance uncertainty** and **quality of horizontal measurement** values of the underlying Meta feature. **horizontal position uncertainty** must not be applied to the spatial type of any geo feature if it is identical to the **horizontal position uncertainty** value(s) of the underlying Meta feature, except for **Sounding** and **Underwater/Awash Rock** features; and **Foul Ground**, **Marine Farm/Culture**, **Obstruction** and **Wreck** features of type point (see clauses 3.8.1.3, 11.3, 13.4-7 and 13.5).

quality of horizontal measurement gives qualitative information, whereas **horizontal position uncertainty** gives quantitative information.

Remarks:

No remarks.

3.2 Vertical uncertainty

If it is required to encode the uncertainty of a vertical clearance (complex attributes **vertical clearance fixed**, **vertical clearance open**, **vertical clearance closed** and **vertical clearance safe**), it must be done using the complex sub-attribute **vertical uncertainty** (see clause 29.42).

If several vertical clearances are given for one feature, the uncertainty given must be that of the least accurate.

Remarks:

No remarks.

3.3 Hierarchy of metadata

The following Table indicates individual feature attributes that supersede meta feature attributes.

Meta feature class	Meta feature attribute	Geo feature attribute
Navigational System of Marks	marks navigational – system of	marks navigational – system of
Quality of Bathymetric Data	horizontal position uncertainty*	horizontal position uncertainty**
Quality of Bathymetric Data	vertical uncertainty*	vertical uncertainty
Quality of Bathymetric Data	vertical uncertainty*	vertical uncertainty**
Quality of Non-Bathymetric Data	horizontal distance uncertainty	horizontal clearance fixed, horizontal clearance open
Quality of Non-Bathymetric Data	horizontal position uncertainty	horizontal position uncertainty**
Quality of Non-Bathymetric Data	orientation uncertainty	orientation uncertainty
Quality of Non-Bathymetric Data	vertical uncertainty	vertical clearance closed, vertical clearance fixed, vertical clearance open, vertical uncertainty**
Quality of Survey	quality of horizontal measurement	quality of horizontal measurement**
Quality of Survey	quality of vertical measurement	quality of vertical measurement
Quality of Survey	technique of vertical measurement	technique of vertical measurement
Vertical Datum of Data	vertical datum	vertical datum

Table 3-1 – Hierarchy of metadata

* The information type **Spatial Quality**, attributes **horizontal position uncertainty** and **vertical uncertainty**, may be associated to **Quality of Bathymetric Data** using the information to feature association **Quality of Bathymetric Data Composition** (see clause 25.9).

** As populated on an associated instance of the information type **Spatial Quality**, using the information to feature association **Spatial Association** (see clause 25.10).

Features and attributes shown in grey text in Table 3-1 above do not play an active role in regard to Inland ECDIS or ECS display and/or performance in terms of hierarchy of the encoding. However, where both the S-401 Meta feature and the attribute for the Geo feature are encoded, end-user interpretation of the Inland ECDIS or ECS Pick Report is that the value populated for the attribute on the Geo feature provides the relevant value.

It is prohibited to use an attribute on an individual feature, if this attribute has the same value as the general value defined by the Meta feature.

3.4 Quality of non-bathymetric data

IHO Definition: QUALITY OF NON-BATHYMETRIC DATA. An area within which a uniform assessment of the quality of the non-bathymetric data exists. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.208, November 2000).

S-401 Metadata Feature: Quality of Non-Bathymetric Data (M_ACCY) (O)

Primitives: Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of temporal variation	(CATTEV)	1 : extreme event 4 : likely to change 5 : Unlikely to Change 6 : Unassessed	EN	1,1
horizontal distance uncertainty	(HORACC)	[xx.xx] (metres), e.g., 1.54	RE	0,1
horizontal position uncertainty	(POSACC)		C	1,1
uncertainty fixed	(POSACC) (SOUACC) (VERACC)	[xxx.xx] (metres)	(S) RE	1,1
uncertainty variable factor			(S) RE	0,1
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>orientation uncertainty</i>			RE	0,1
<i>survey date range</i>		See clause 2.4.8	C	0,1
<i>date end</i>	(SUREND)		(S) TD	1,1
<i>date start</i>	(SURSTA)		(S) TD	0,1
vertical uncertainty			C	0,1
uncertainty fixed	(VERACC)	[xx.xx] (metres), e.g., 1.54	(S) RE	1,1
uncertainty variable factor	(POSACC) (SOUACC) (VERACC)	[xxx.xx] (metres)	(S) RE	0,1
information	(INFORM)	See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
<i>headline</i>			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †

Reported Date	(SORDAT)		TD	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0, *
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0, *
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0, *

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

3.4.1 Quality of non-bathymetric data

The Meta feature **Quality of Non-Bathymetric Data** may be used to provide an indication of the overall uncertainty of position for all non-bathymetric features. It must not be used to provide the uncertainty of bathymetric information.

horizontal position uncertainty on the **Quality of Non-Bathymetric Data** applies to non-bathymetric data situated within the area, while **quality of horizontal measurement** or **horizontal position uncertainty** on the associated spatial types qualifies the location of the **Quality of Non-Bathymetric Data** feature itself.

Remarks:

- No remarks.

Distinction: Quality of Bathymetric Data; Quality of Survey.

Inland specific Encoding Instructions:

- A) The information in the attributes may be applied to any spatial type, in order to qualify the location of a feature.
- B) The attributes must not be applied to the spatial type of any geo feature if they are identical to the values of the underlying meta feature.
- C) Meta features Quality of Non-bathymetric Data and Quality of Bathymetric Data should not overlap.
- D) The accuracy of data is only encoded in areas where accuracy of data is available and clearly defined.

3.5 Data coverage

IHO Definition: DATA COVERAGE. A geographical area that describes the coverage and extent of spatial objects. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.210, November 2000).

S-401 Metadata Feature: Data Coverage (M_COVR) (M_CSCL) (M)

Primitives: Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
drawing index			IN	0,1
interoperability identifier		MRN (see clause 27.161)	URN	0,1
Category of Coverage	(CATCOV)	1: Coverage Available 2: No Coverage Available	EN	1, 1
maximum display scale		See Table 3-2 below maximum display scale ≤ optimum display scale < minimum display scale	IN	1,1
minimum display scale		See Table 3-2 below minimum display scale ≥ optimum display scale > maximum display scale	IN	1,1
optimum display scale	(CSCALE)	See Table 3-2 below maximum display scale ≤ optimum display scale < minimum display scale	IN	1,1
information	(INFORM)	See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
Reported Date	(SORDAT)		TD	0, 1

Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0, *
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 †
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0, *

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

3.5.1 Coverage

The Meta feature **Data Coverage** encodes the area covered by data within the dataset. This feature can also be used to provide the Inland ECDIS or ECS with the scale information necessary for the determination of dataset loading and rendering (display) in relation to the user selected viewing scale in the Inland ECDIS or ECS. There must be a minimum of one **Data Coverage** feature in the dataset. **Data Coverage** features must cover the equivalent area to the extent of the spatial types in the dataset, and must not overlap (see clause 2.5.1).

Where populated, all **Data Coverage** features in the dataset must have the same value for the attribute **drawing index**, as datasets that share a common drawing index are intended to form a seamless presentation, regardless of the populated value(s) for minimum display scale. **Data Coverage** features which share a common drawing index must not overlap.

The attribute **optimum display scale** is used to indicate the intended viewing scale for the data. The value populated for **optimum display scale**, therefore, provides a reference for the user selected viewing scale in the Inland ECDIS or ECS at which the overscale warning will be displayed as the boatmaster continues to zoom in if there is no larger optimum display scale IENC dataset available.

The attribute **minimum display scale** is used to indicate the smallest intended viewing scale for the data where a full portfolio of IENCs is available; and provides the reference scale that defines a “series” of IENCs covering a geographic area intended to be displayed seamlessly. Where an empty (null) value is populated for **minimum display scale**, the Inland ECDIS or ECS will continue to display the data regardless of how small the user selected viewing scale becomes. The value populated for **minimum display scale**, therefore, is intended to be used in a series of IENC cells covering a geographic area to determine the dataset rendering (display) priority as the user selected viewing scale becomes larger.

The mandatory attribute **maximum display scale** is used to indicate the scale at which the Data Producer considers that the “grossly overscaled” warning is to be triggered based on the user selected viewing scale.

For IENC, in order to provide a consistent relationship between the encoded data and the way the data is displayed in Inland ECDIS or ECS, the values for minimum display scale and optimum display scale can be taken from the values listed in the following Table:

Scale
NULL (only allowed on minimum display scale (data will continue to be displayed))
1:10,000,000
1:3,500,000
1:1,500,000
1:700,000
1:350,000
1:180,000
1:90,000
1:45,000
1:22,000
1:12,000
1:8,000
1:4,000
1:3,000
1:2,000
1:1,000
1:500
1:200 (only allowed on optimum and maximum display scale)

Table 3-2 – Optimum and minimum display scale values

[NOTE: The selection of values for **maximum display scale** and **minimum display scale** for any selected **optimum display scale** are at the discretion of the Data Producer. That is, any value listed for **maximum display scale** and **minimum display scale** above may be selected from any of the listed values, with the only restriction being that **maximum display scale** must be a smaller value than/equal to **optimum display scale** which must be a smaller value than **minimum display scale** (or any value if **minimum display scale** is populated with an empty (null) value).]

Typically, only a single **Data Coverage** feature should be used in a dataset. However, if the optimum display scale is different for discrete areas within a single IENC dataset, this must be indicated by encoding separate, non-overlapping **Data Coverage** features, each having a different value populated for **optimum display scale**. Producing Authorities are to note, however, that excessive use of multiple **Data Coverage** features having different values of **optimum display scale** within a single dataset should be avoided. Where different values of **optimum display scale** are used, this should be restricted only to data compiled in order to achieve the intended navigational usage for the entire dataset. Datasets must have the same value for **minimum display scale** for all **Data Coverage** features in the dataset. Datasets may have different values populated for **maximum display scale** for the **Data Coverage** features in the dataset; these values are typically populated as the value corresponding to 2 x the scale (or half the denominator) value populated for **optimum display scale** (this will replicate the corresponding gross overscale indication as implemented in S-57/S-52), but are at the discretion of the Data Producer. For example, the value for **maximum display scale** may be set to the same value as **optimum display scale** to have the “grossly overscaled” warning appear at any larger user selected viewing scale than **optimum display scale**; or populated as the value corresponding to the **minimum display scale** value for the next largest scale dataset(s) in the IENC portfolio.

Where a series of differing optimum display scale IENC datasets are compiled covering the same geographic area, the smallest scale value populated for **optimum display scale** for **Data Coverage** feature(s) in the dataset should correspond to the **minimum display scale**, where populated, for the next largest optimum display scale IENC dataset. The largest scale value populated for **optimum display scale** for **Data Coverage** feature(s) in the dataset must not be a larger scale value than the optimum display scale for the next largest optimum display scale IENC dataset, where such a dataset exists.

Remarks:

- This Meta feature is intended to support an indication of coverage; and facilitates the loading and rendering (display) of datasets in the end-user system.
- Where more than one **Data Coverage** feature exists for a dataset, the dataset, when initially loaded, will be displayed in the Inland ECDIS or ECS at a display scale corresponding to the largest scale value populated for **optimum display scale**.
- Where a dataset consists of only one **Data Coverage** feature, the value for the optimum display scale populated in the dataset discovery metadata must be the same as the value populated for **optimum display scale** on the **Data Coverage**.
- Except for the largest scale dataset coverage, datasets with multiple **Data Coverage** features must not have excessive differences in the values populated for **optimum display scale** between the **Data Coverage** features. Typically, this should be interpreted as there being no more than one scale step value as defined in Table 3-2 above between the **optimum display scale** values in a single dataset.

Distinction:

Inland specific Encoding Instructions:

- A) All spatial features in an IENC must be covered by a **Data Coverage** (M_COVR) with **category of coverage** (CATCOV) = 1 (coverage available) surface feature.
- B) US & RU: The use of **category of coverage** (CATCOV) = 2 (no coverage available) is required
- C) EUR: The use of **category of coverage** (CATCOV) = 2 (no coverage available) is optional

3.6 Navigational system of marks

IHO Definition: NAVIGATIONAL SYSTEM OF MARKS. An area within which the navigational system of marks has been established in relation to a specific direction. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.214, November 2000).

S-401 Metadata Feature: Navigational System of Marks (m_nsyst) (M)

Primitives: Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
marks navigational – system of	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 10: other system 11 : main European inland waterway marking system 12 : Russian Inland Waterway Regulations 13 : Brazilian National Inland Waterway Regulation 15 : Paraguay-Parana Waterway - Brazilian Complementary Aids	EN	1,1
<i>information</i>	(INFORM)	See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
Reported Date	(SORDAT)		TD	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police	(S) EN	0, 1

		12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

† Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

3.6.1 Buoyage systems

The buoyage system of the dataset must be encoded using the Meta feature **Navigational System of Marks**:

All parts of the dataset containing data must be covered by **Navigational System of Marks** features, with the attribute **marks navigational – system of** indicating the buoyage system in operation. **Navigational System of Marks** features must not overlap.

Individual buoys and beacons may not be part of the general buoyage system. This should be encoded using the attribute **marks navigational – system of** on these buoy and beacon features.

Remarks:

- For guidance regarding the encoding of aids to navigation in the IALA maritime buoyage system, see clause 18.3.1.1.
- If it is required to encode an area within which the navigational system of marks has been established in relation to a specific direction, it must be done using the feature **Local Direction of Buoyage** (see clause 3.7).

Distinction: Local Direction of Buoyage.

Inland specific Encoding Instructions:

- A) The Metadata Feature **Navigational System of Marks** (m_ns) surface should only cover those areas that contain IENC data.
- B) US: All inland waterways in the United States use IALA B.
- C) EUR: In areas with mixed systems (IALA-A and main European inland waterway marking system) code **marks navigational – system of** (MARSYS) according to majority of marks and code individual deviant marks at feature level to the appropriate system.
- D) RU: All inland waterways in Russia use **marks navigational – system of** (MARSYS) = 12 (Russian inland waterway regulations).
- E) BR: All national inland waterways in Brazil use **marks navigational – system of** (MARSYS) =13 (Brazilian national inland waterway regulations). In areas with mixed systems (IALA B and one above) use **marks navigational – system of** (MARSYS) = 2 (IALA B) and code individual deviant marks to the appropriate system (MARSYS = 13 or 14).
- F) BR: Paraguai-Parana International Waterway: In Brazilian extent, use **marks navigational – system of** MARSYS)= 2 (IALA B) and code Brazilian complementary aids with MARSYS = 15 (Paraguai-Parana waterway - Brazilian complementary aids).

3.7 Local direction of buoyage

IHO Definition: LOCAL DIRECTION OF BUOYAGE. An area within which the navigational system of marks has been established in relation to a specific direction. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.214, November 2000).

S-401 Metadata Feature: Local Direction of Buoyage (*m_nsyst*) (C)

Primitives: Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol			
S-401 Attribute		S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
<i>interoperability identifier</i>			MRN (see clause 27.161)	URN	0,1
marks navigational – system of	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 10 : other system 11 : main European inland waterway marking system 12 : Russian Inland Waterway Regulations 13 : Brazilian National Inland Waterway Regulations 15 : Paraguay-Parana Waterway - Brazilian Complementary Aids	EN	1,1	
orientation value	(ORIENT)	[xxx.xx or "unknown"] (degree (°)), e.g., 110.76	RE	1,1	
scale minimum	(SCAMIN)	22 000 or see clause 2.5.9	IN	0,1	
<i>information</i>	(INFORM)	See clause 2.4.6	C	0,*	
file locator			(S) TE	0,1	
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †	
headline			(S) TE	0,1	
language		ISO 639-2/T	(S) TE	1,1	
text	(INFORM) (NINFORM)		(S) TE	0,1 †	
Reported Date	(SORDAT)		TD	0, 1	
Source Indication			C	0, 1	
<i>Reported Date</i>			(S) TD	0, 1	

<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0, *
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 †
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0, *
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0, *

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

3.7.1 Local direction of buoyage

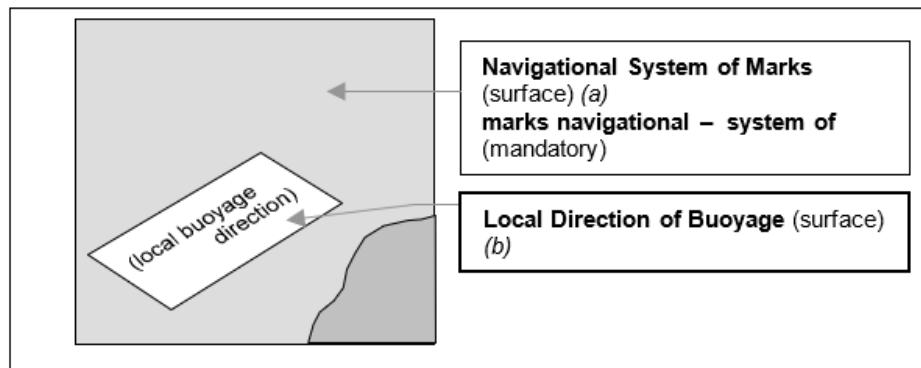


Figure 3-1 – Buoyage system and direction

Within a dataset, there may be some areas where the direction of buoyage is defined by local rules and must, therefore, be specified. If required, these areas must be encoded as **Local Direction of Buoyage** features, with the mandatory attribute **orientation value** indicating the direction of buoyage. **Local Direction of Buoyage** features must not overlap, but in areas where local buoyage directions apply, **Local Direction of Buoyage** features must overlap **Navigational System of Marks** features (see clause 3.6) (see Figure 3-1 above).

Remarks:

The mandatory attribute **marks navigational – system of** is required for Inland ECDIS or ECS portrayal, and must be populated with the same value as populated for the **marks navigational – system of** on the underlying **Navigational System of Marks** feature.

Distinction:

Navigational System of Marks.

Inland specific Encoding Instructions:

- EUR: This feature is used to encode the local direction of buoyage for waterways without a defined direction, for example intertidal creeks.
- EUR: For bendy intertidal creeks it may be necessary to encode several Metadata Features **Local Direction of Buoyage** with appropriate **orientation values** (ORIENT) to ensure that the displayed arrow aligns with creek axis.

3.8 Quality of bathymetric data

IHO Definition: QUALITY OF BATHYMETRIC DATA. An area within which a uniform assessment of the quality of the bathymetric data exists. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.216, November 2000).

S-401 Metadata Feature: Quality of Bathymetric Data (M_QUAL) (C)

Primitives: Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
		 <i>(for CATZOC=6)</i>		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
<i>category of temporal variation</i>		1 : extreme event 2 : likely to change and significant shoaling expected 3 : likely to change but significant shoaling not expected 4 : likely to change 5 : unlikely to change 6 : unassessed	EN	0,1
<i>data assessment</i>		1 : assessed 2 : assessed (oceanic) 3 : unassessed	EN	0,1
depth range maximum value	(DRVAL2)		RE	0,1
depth range minimum value	(DRVAL1)		RE	0,1
<i>features detected</i>			C	0,1
least depth of detected features measured			(S) BO	1,1
significant features detected			(S) BO	1,1
size of features detected			(S) RE	0,1
<i>full seafloor coverage achieved</i>			BO	0,1
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>survey date range</i>		See clause 2.4.8	C	0,1
date end	(SUREND)		(S) TD	1,1
date start	(SURSTA)		(S) TD	0,1
zone of confidence			C	0,*

category of zone of confidence in data	CATZOC	1 : zone of confidence A1 2 : zone of confidence A2 3 : zone of confidence B 4 : zone of confidence C 5 : zone of confidence D 6 : zone of confidence U	EN	0,1
fixed date range		See clause 2.4.8	(S) C	0,1
date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
Horizontal Position Uncertainty	(POSACC)		(S) C	0, 1
Uncertainty Fixed	(POSACC) (SOUACC) (VERACC)	[x.xx] The best estimate of the accuracy of the sounding data. Minimum value: 0; Resolution: 0.01 m	(S) RE	1, 1
Uncertainty Variable Factor			(S) RE	0, 1
Vertical Uncertainty	(VERACC)		(S) C	0, 1
Uncertainty Fixed	(POSACC) (SOUACC) (VERACC)	[x.xx] The best estimate of the accuracy of the sounding data. Minimum value: 0; Resolution: 0.01 m	(S) RE	1, 1
Uncertainty Variable Factor			(S) RE	0, 1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFOM)		(S) TE	0,1 [†]
Technique of Vertical Measurement	(TECSOU)	1 : Found by Echo Sounder 2 : Found by Side Scan Sonar 3 : Found by Multi Beam 4 : Found by Diver 5 : Found by Lead Line 6 : Swept by Wire-Drag 8 : Swept by Vertical Acoustic System 9 : Found by Electromagnetic Sensor 10 : Photogrammetry 11 : Satellite Imagery 12 : Found by Levelling 13 : Swept by Side Scan Sonar 15 : Found by LIDAR 16 : Synthetic Aperture Radar 17 : Hyperspectral Imagery 18 : Mechanically Swept	EN	0, 1

Reported Date	(SORDAT)		TD	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
-	Quality of Bathymetric Data Composition (see clause 25.9)	Spatial Quality	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] The sub-complex attribute **fixed date range** is mandatory if more than one instance of the complex attribute **zone of confidence** is encoded.

The sub-complex attributes **horizontal position uncertainty** and **vertical uncertainty** are mandatory if the **Quality of Bathymetric Data** instance is not associated to a **Spatial Quality** instance using the association **Quality of Bathymetric Data Composition**.

For each instance of fixed date range, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

3.8.1 Quality, reliability and uncertainty of bathymetric data

Information about quality, reliability and uncertainty of bathymetric data is given using:

- the Meta feature **Quality of Bathymetric Data** and, if required, an associated instance of the Information type **Spatial Quality** (see clause 24.5) for an overall assessment of the quality of bathymetric data;
- the Meta feature **Quality of Survey** for additional information about individual surveys (see clause 3.11);
- the attributes **quality of vertical measurement** and **technique of vertical measurement** on groups of soundings or individual features;
- the attributes **horizontal position uncertainty**, **quality of horizontal measurement** and **vertical uncertainty** on the spatial types (see clauses 2.4.7 and 24.5).

Bathymetric data quality comprises the following:

- completeness of data (for example, seafloor coverage);
- currency of data (for example, temporal degradation);
- uncertainty of data;
- source of data.

For the boatmaster, **Quality of Bathymetric Data** provides the most useful information. Therefore, the use of **Quality of Bathymetric Data** is mandatory for areas containing depth data or bathymetry on IENC datasets at optimum display scale 1:700000 and larger.

In order to provide an indication of the horizontal position and vertical accuracies of the features to which it applies, instances of **Quality of Bathymetric Data** must have the sub-complex attributes **horizontal position uncertainty** and **vertical uncertainty** populated on **Quality of Bathymetric Data**, or alternately on an associated instance of the information type **Spatial Quality** (see clause 24.5), using the association **Quality of Bathymetric Data Composition** (see clause 25.9).

More detailed information about a survey may be given using **Quality of Survey** (see clause 3.11). For example, in incompletely surveyed areas, lines of passage soundings may be indicated as such using a curve **Quality of Survey** feature. This information is more difficult for the boatmaster to interpret, therefore the use of **Quality of Survey** is optional.

For individual features (wrecks, obstructions etc), or individual/small groups of soundings, **quality of vertical measurement**, **technique of vertical measurement**, **horizontal position uncertainty** and **vertical uncertainty** may be used to provide additional information about quality and uncertainty.

The Meta feature **Quality of Bathymetric Data** defines areas within which uniform assessment exists for the quality of bathymetric data, and must be used, where required, to provide an assessment of the overall quality of bathymetric data to the boatmaster. Therefore, areas of a dataset containing depth data or bathymetry at optimum display scale 1:700000 and larger may be covered by one or more **Quality of Bathymetric Data**, which may overlap vertically in order to define the quality of bathymetric data at varying depths in the water column.

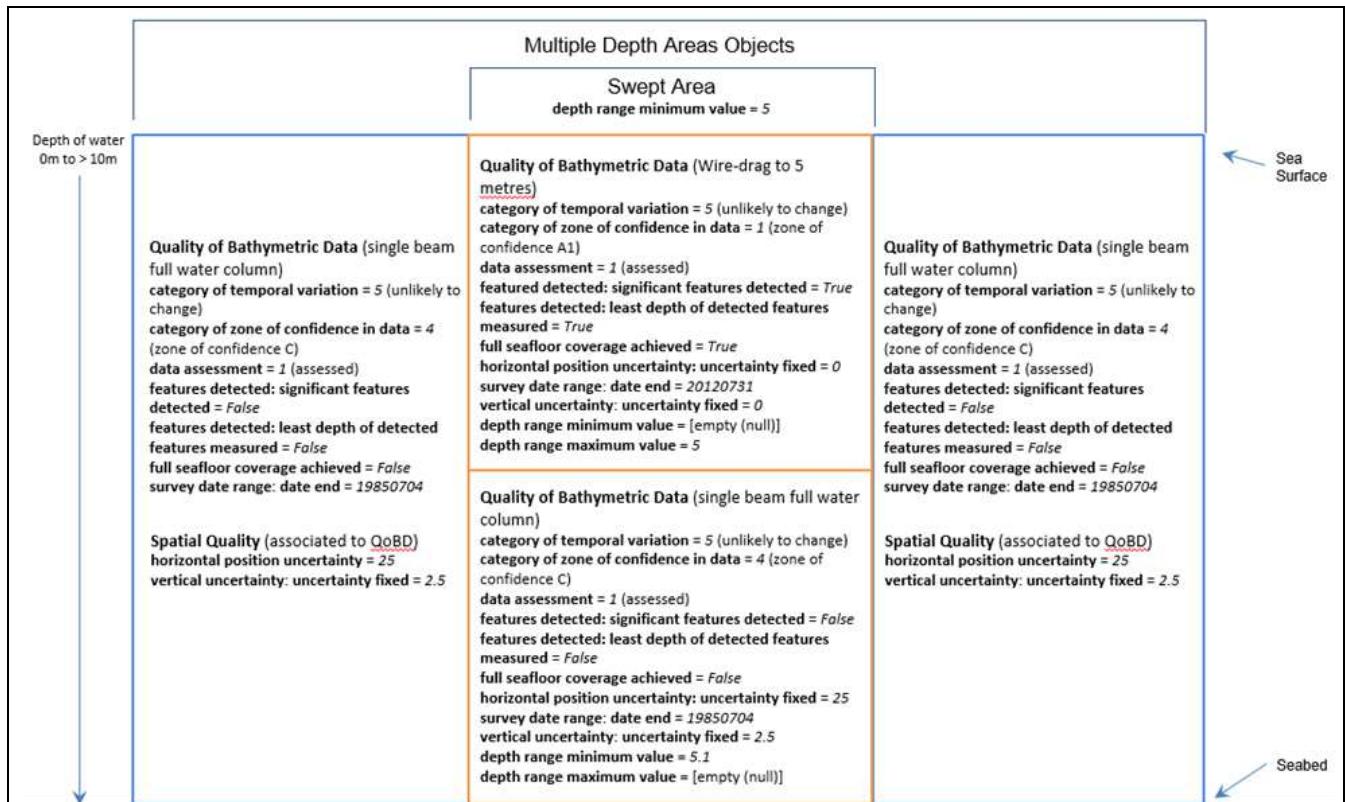


Figure 3-2 – Adjoining and overlapping Quality of Bathymetric Data features

The Figure 3-2 above demonstrates the encoding for varying quality of bathymetric data in the water column, in this example a mechanically swept area to a depth of 5 metres that has also been previously surveyed using single beam echo sounder to the seabed. For the **Quality of Bathymetric Data** feature that defines the data quality for the swept area, it is important to note that the recommended attribution shown above is intended to provide the highest (best) quality indicator for vessels navigating at a safety depth of less than 5 metres in the area. For vessels navigating at a safety depth of greater than 5 metres in the area, or at any depth outside the area, the lower quality indicator will be provided.

NOTE: Figure 3-2 demonstrates the two options for the encoding of the horizontal position and vertical uncertainties available in S-401. For the area covered by the swept area, the varying horizontal position and vertical uncertainties in the water column are encoded using the sub-complex attributes **horizontal position uncertainty** and **vertical uncertainty** on the **Quality of Bathymetric Data** features. For the two areas covered only by the single beam echo sounder survey to the seabed, the horizontal position and vertical uncertainties are encoded using the sub-complex attributes **horizontal position uncertainty** and **vertical uncertainty** on an associated **Spatial Quality** feature (which may be a single **Spatial Quality** feature associated to both **Quality of Bathymetric Data** features). See the Remarks below and clause 24.5.

Remarks:

- The mandatory attribute **data assessment** provides an overall indicative level of assessment of bathymetric data from which further attribution is derived, and assists with portrayal of bathymetric data quality information in Inland ECDIS or ECS:
 - Where the value for **data assessment** is set to 1 (assessed), all additional attribution for the **Quality of Bathymetric Data** feature must be indicative of the quality of bathymetric data for the area.
 - Where the value for **data assessment** is set to 2 (assessed (oceanic)), all additional attribution for the **Quality of Bathymetric Data** feature should be indicative of the quality of bathymetric data for the area for a boatmaster's Inland ECDIS or ECS pick report, however no portrayal of the quality information will display on the Inland ECDIS or ECS. This value should only be used to cover open ocean (oceanic) depths in waters deeper than 200 metres.
 - Where the value for **data assessment** is set to 3 (unassessed), the mandatory attributes **category of temporal variation** = 6 (unassessed); **features detected** (**least depth of detected features measured** and **significant features detected**) = *False*; **full seafloor coverage achieved** = *False*; and **category of zone of confidence in data** = 6 (zone of confidence U); and **horizontal position uncertainty (uncertainty fixed)** and **vertical uncertainty (uncertainty fixed)** on **Quality of Bathymetric Data** or the associated **Spatial Quality** = empty (null) must be populated.
- Wherever possible, meaningful and useful values for the attributes **category of temporal variation**, **full seafloor coverage achieved**, and the complex attribute **features detected** must be used for areas of bathymetry. For areas of unstable seafloors, the complex attribute **survey date range (date end)** should be used to indicate the date of the survey of the underlying bathymetric data.
- As a result of some disasters, for example earthquakes, tsunamis, hurricanes, it is possible that large areas of seafloor have moved and/or become cluttered with dangerous obstructions. Emergency surveys may subsequently be conducted over essential shipping routes and inside harbours. Outside these surveys, all existing detail is now suspect, whatever the quality of the previous surveys. In such cases, the attribute **category of temporal variation** should be reclassified to value 1 (extreme event), the Boolean attribute **full seafloor coverage achieved** set to *False*; complex attribute **features detected**, Boolean sub-attributes **least depth of detected features measured** and **significant features detected** set to *False*; the **zone of confidence** sub-attribute **category of zone of confidence in data** reclassified to 5 (zone of confidence D); and the sub-attributes **horizontal position accuracy (uncertainty fixed)** and **vertical uncertainty (uncertainty fixed)** on **Quality of Bathymetric Data** or the associated **Spatial Quality** populated with an empty (null) value in the affected areas outside the area covered by emergency surveys.
- To express completeness of bathymetric data, the complex attribute **features detected** must be encoded. **features detected** indicates that a systematic method of exploring the seafloor, or the water column to the depth indicated by population of the attribute **depth range maximum value**, was undertaken to detect significant features. The sub-attributes **size of features detected** and **least depth of detected features measured** must not be encoded unless the sub-attribute **significant features detected** is set to *True*.
- The mandatory complex attribute **zone of confidence** is used on a **Quality of Bathymetric Data** feature to provide an overall indication of the accuracy of the bathymetric data in the area; and may be used to specify the vertical and horizontal position uncertainty of the depths covered by the surface. Where **category of temporal variation** is set to values 2 (likely to change and significant shoaling expected) or 3 (likely to change but significant shoaling not expected), multiple instances of the complex attribute **zone of confidence** should be encoded to provide an indication of the degradation of the overall accuracy as well as the vertical and horizontal position uncertainty of the charted bathymetric information over time.
 - Wherever possible, meaningful and useful values of the mandatory sub-attribute **category of zone of confidence in data** should be used (that is, values other than **category of zone of confidence in data** = 6 (zone of confidence U)) for areas of bathymetry. These values must be

determined from the **category of zone of confidence in data** definition table (see clause 27.102) in accordance with the values populated for the attribute **full seafloor coverage achieved**, the complex attribute **features detected** and the sub-complex attributes **horizontal position uncertainty** and **vertical uncertainty** on the **Quality of Bathymetric Data** or the associated **Spatial Quality** (see the following Remarks bullet).

- The sub-complex attribute **fixed date range** is used to define the date range(s) where the quality is degraded over time. Where multiple date ranges are specified, the **date start** of an instance must be equal to the **date end** of the previous instance. Within the sequence, the **date start** of the first instance and the **date end** of the last instance should not be populated; the values populated for **fixed date range** must not result in the removal of the indication of bathymetric data quality for an area from the boatmaster.
- The sub-complex attributes **horizontal position uncertainty** and **vertical uncertainty** must be encoded using either **Quality of Bathymetric Data** or the Information feature **Spatial Quality** (see clause 24.5). The decision as to which option to use should be based on whether the horizontal position and vertical uncertainty values are specific to a single **Quality of Bathymetric Data** feature or relates to multiple **Quality of Bathymetric Data** features. In general, specific values are related to areas of changeable bathymetry over time or varying bathymetric data quality in the water column (as shown in Figure 3-2 above); and repeating values are specific to general quality uncertainty values in non-changeable areas. It is prohibited to use both options for a single **Quality of Bathymetric Data** instance.
 - **vertical uncertainty** on the **Quality of Bathymetric Data** or the associated **Spatial Quality** is used to specify the vertical uncertainty of the depths covered by the surface within a specified date range (where encoded); and should be adjusted to indicate the degradation of the vertical uncertainty over time where multiple instances of **zone of confidence** are encoded (see above bullet). When **depth range minimum value** is specified on **Quality of Bathymetric Data**, **vertical uncertainty** refers only to the uncertainty of the swept depth defined by **depth range minimum value**.
 - **horizontal position uncertainty** on the **Quality of Bathymetric Data** or the associated **Spatial Quality** is used to specify the positional uncertainty of the depths covered by the surface within a specified date range (where encoded); and should be adjusted to indicate the degradation of the horizontal position uncertainty over time where multiple instances of **zone of confidence** are encoded (see above).
- **depth range minimum value** must only be used on a **Quality of Bathymetric Data** feature where a swept area occupies the entire **Quality of Bathymetric Data** surface, or **Quality of Bathymetric Data** features overlap. Where these features overlap such that varying bathymetric data qualities exist at different depths in the water column, the **depth range minimum value** for a **Quality of Bathymetric Data** must be set to a value 0.1 metres deeper than the **depth range maximum value** for the **Quality of Bathymetric Data** feature defining the quality for the level above; and the topmost **Quality of Bathymetric Data** must have **depth range minimum value** set to an empty (null) value (see Figure 3-2 above).
- **depth range maximum value** must only be used on a **Quality of Bathymetric Data** feature to specify the maximum depth to which all other attributes for the **Quality of Bathymetric Data** feature applies. When **depth range maximum value** is specified, values populated for all other attributes apply only to depths equal to or shoaler than **depth range maximum value**. No quality information is provided for depths deeper than **depth range maximum value**. Where **Quality of Bathymetric Data** features overlap such that varying bathymetric data qualities exist at different depths in the water column, the **depth range maximum value** for a **Quality of Bathymetric Data** must be set to a value 0.1 metres shoaler than the **depth range minimum value** for the **Quality of Bathymetric Data** feature defining the quality for the level below; and the bottommost **Quality of Bathymetric Data** must have **depth range maximum value** set to an empty (null) value (see Figure 3-2 above).
- **Quality of Bathymetric Data** must be encoded over **Unsurveyed Area** features that contain any depth data or bathymetry (depth contours, obstructions, soundings, underwater rocks, wrecks); and must have mandatory attributes **data assessment = 1** (assessed) **category of temporal**

variation = 6 (unassessed); **features detected (least depth of detected features measured and significant features detected)** = *False*; **full seafloor coverage achieved** = *False*; and **zone of confidence (category of zone of confidence in data)** = 5 (zone of confidence D). The **vertical uncertainty (uncertainty fixed)** and **horizontal position uncertainty (uncertainty fixed)** for the **Quality of Bathymetric Data** or the associated **Spatial Quality** should be populated with an empty (null) value.

- For **Unsurveyed Area** features that do not contain any depth data or bathymetry, it is not required to encode a **Quality of Bathymetric Data** feature that covers the area.
- If the attribute **technique of vertical measurement** is required, it must be encoded on either the Meta feature **Quality of Survey** (see clause 3.11) or on individual geo features (for example **Sounding**).
- When the **Quality of Bathymetric Data** surface contains data from only one survey, the date of survey should be specified using the complex attribute **survey date range**, sub-attribute **date end**. When the **Quality of Bathymetric Data** surface contains data from two or more surveys, the date of the most recent and the oldest survey should be specified using the complex attribute **survey date range**.
- **Quality of Bathymetric Data** areas must not be encoded over land.
- **Spatial Quality (horizontal position uncertainty)** associated to the **Quality of Bathymetric Data** using the association **Quality of Bathymetric Data Composition** (see clause 25.9), where encoded, applies to bathymetric data situated within the surface, while **Spatial Quality (quality of horizontal measurement)** or **(horizontal position uncertainty)** on the associated spatial types using the association **Spatial Association** (see clause 25.10) qualifies the location of the **Quality of Bathymetric Data** feature itself.
- Meta features **Quality of Bathymetric Data** and **Quality of Non-Bathymetric Data** may overlap.
- Additional quality information may be given using the Meta feature **Quality of Survey**.

3.8.1.1 Temporal variation

The indication of degrading quality of bathymetry over time should be encoded using multiple instances of the complex attribute **zone of confidence** where required (see 5th to 8th bullet points in clause 3.8.1 above).

The changeability of the bathymetry must be encoded using **category of temporal variation**. In order for a time reference to be given for the expression of temporal variation, the relevant dates of the bathymetric data should be encoded using the complex attribute **survey date range** if **category of temporal variation** is set to 1 (extreme event), 2 (likely to change and significant shoaling expected) or 3 (likely to change but significant shoaling not expected). Consideration should be given, in particular, for the encoding of **survey data range** if multiple instances of **zone of confidence** are not encoded to provide an indication of the degradation of the overall accuracy of the charted bathymetric information over time, in order to provide the Mariner with a temporal frame of reference for decision making.

3.8.1.2 Feature detection

In the context of bathymetry, a feature is any object, whether manmade or not, projecting above the seafloor, which may be considered a danger to surface navigation. Refer to IHO Publication S-44.

The ability to detect bathymetric features must be encoded using the complex attribute **features detected**. The sub-attribute **significant features detected** indicates whether the survey was capable of detecting features of a size indicated by the sub-attribute **size of features detected**. The sub-attribute **least depth of detected features measured** indicates whether the least depth of detected features was found. For instance, if a wreck was found, but it is not certain that the least depth of that wreck was measured, **least depth of detected features measured** must be set to *False*.

3.8.1.3 Sounding uncertainty

Sounding uncertainty is encoded using the complex attribute **zone of confidence**, sub-complex attribute **vertical uncertainty** on **Quality of Bathymetric Data**; or alternatively using an associated instance of the information type **Spatial Quality**, complex attribute **spatial accuracy** (see clause 24.5) and using the association **Quality of Bathymetric Data Composition** (see clause 25.9). If it is required to encode additional sounding uncertainty information, it must be done using the attributes **quality of vertical measurement** and **technique of vertical measurement** on groups of soundings or individual features; or by associating another instance of the information type **Spatial Quality** to the spatial type associated with the individual geo features.

The vertical and horizontal position uncertainty values populated on the instance of **Quality of Bathymetric Data** or the associated **Spatial Quality** must reflect the most commonly associated values for the **Obstruction**, **Sounding**, **Underwater/Awash Rock** and **Wreck** features within the area.

Distinction: Quality of Non-Bathymetric Data; Quality of Survey; Spatial Quality.

Inland specific Encoding Instructions:

- A) The **Quality of Bathymetric Data** (M_QUAL) surface should only cover those areas that contain IENC data.
- B) US: Refer to ZOC table in 29.44 for a description of categories.
- C) RU: Currently all IENCs are coded with **category of zone of confidence in data** (CATZOC)=1
- D) The vertical uncertainty for soundings is only given in those areas where detailed depth information is provided. The Metadata Feature shares the geometry with those surfaces.
- E) **Technique of vertical measurement** (TECSOU) has to be used to give the technique of the sounding measurement.
- F) **Vertical uncertainty** (SOUACC) should be used to give information about the accuracy of the sounding data.
- G) **Horizontal position uncertainty** (POSACC) should be used to give information about the accuracy of a position.

3.9 Sounding Datum

IHO Definition: **SOUNDING DATUM.** The horizontal plane or tidal datum to which soundings have been reduced. Also called datum for sounding reduction. (Adapted from IHO Dictionary – S-32). The **Sounding Datum** for inland waterways is in most cases not a horizontal plane but a sloping plane.

S-401 Metadata Feature: Sounding Datum (m_sdat) (O)

Primitives: Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol	Type	Multiplicity
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
vertical datum	(VERDAT)	1 : mean low water springs 2 : mean lower low water springs 3 : mean sea level 4 : lowest low water 5 : mean low water 6 : lowest low water springs 7 : approximate mean low water springs 8 : indian spring low water 9 : low water springs 10 : approximate lowest astronomical tide 11 : nearly lowest low water 12 : mean lower low water 13 : low water 14 : approximate mean low water 15 : approximate mean lower low water 19 : approximate mean sea level 22 : equinoctial spring low water 23 : lowest astronomical tide 24 : local datum 25 : international great lakes datum 1985 26 : mean water level 27 : lower low water large tide 30 : Highest Astronomical Tide 31 : Local Low Water Reference Level 32 : Local High Water Reference Level 33 : Local Mean Water Reference Level 34 : Equivalent Height of Water (German GIW) 35 : Highest Shipping Height of Water (German HSW)	EN	1,1

		36 : Reference Low Water Level According to Danube Commission 37 : Highest Shipping Height of Water According to Danube Commission 38 : Dutch River Low Water Reference Level (OLR) 39 : Russian Project Water Level 40 : Russian Normal Backwater Level 41 : Ohio River Datum 43 : Dutch High Water Reference Level 44 : baltic sea chart datum 2000 45 : Dutch Estuary Low Water Reference Level (OLW)		
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
Reported Date	(SORDAT)		TD	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs	(S) EN	0, 1

		12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data		
....Source	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

3.9.1 Sounding datum

For depth information that is encoded using the attributes **value of sounding**, **depth range minimum value**, **depth range maximum value** and **value of depth contour** the sounding datum is encoded using the Meta feature **Sounding Datum**, and must be constant over large areas.

All parts of the dataset containing depth data or bathymetry must be covered by **Sounding Datum** features, with the attribute **vertical datum** indicating the sounding datum. **Sounding Datum** features must not overlap.

For sounding features (**Sounding**) both the position and depth information is encoded by means of coordinates, with the depth information stored in the Z-coordinate. The sounding datum is defined by the Coordinate Reference System (CRS) for the Z-Coordinate ("Coordinate in Z Axis" [ZCOO] subfield of the "3-D Integer Coordinate Tuple" [C3IT] field or the "3-D Integer Coordinate List" [C3IL] field).

The definition of the CRS is stored in the "Dataset Coordinate Reference System" record and referred by the "Vertical CRS Id" [VCID] subfield of the "3-D Integer Coordinate Tuple" [C3IT] field or the "3-D Integer Coordinate List" [C3IL] field.

The CRS for the Z-coordinate should also have the subfield "Axis Type" [AXTY] of the corresponding "Coordinate System Axes" [CSAX] field set to 12 (Gravity Related Depth).

Note, that because every ZCOO value is explicitly linked to sounding datum there is no default value.

Remarks:

- The default sounding datum of the dataset must be encoded using the Meta feature **Sounding Datum**, and must be equivalent to the definition of the CRS as stored in the "Dataset Coordinate Reference System" record for the dataset.
- If an area of the dataset is referenced to a different sounding datum than the default, a separate **Sounding Datum** feature must be encoded. All parts of the dataset covered by **Quality of Bathymetric Data** features (see clause 3.8) must be covered by **Sounding Datum** features, with the attribute **vertical datum** indicating the sounding (depth) datum.

- The vertical CRS encoded in the Coordinate Reference System record fields for soundings is not utilized by the Inland ECDIS or ECS in conveying the sounding datum information for an IENC to the boatmaster in Inland ECDIS or ECS. This information is provided instead using **Sounding Datum**. See also S-401 Product Specification Main document, clause 5.3.
- Sounding groups, depth contours and depth areas going across areas having different values of sounding datum must be split at the border of those areas. Other features that should be split include **Marine Farm/Culture**, **Obstruction** and **Wreck**, but only where the value of **value of sounding** is known; and **Berth**, **Cable Submarine**, **Deep Water Route Centreline**, **Deep Water Route Part**, **Dredged Area**, **Dry Dock**, **Fairway**, **Floating Dock**, **Gate**, **Pipeline Submarine/On Land**, **Recommended Route Centreline**, **Recommended Track**, **Two-Way Route Part** and **Quality of Bathymetric Data**, but only if the value of **depth range minimum value** and/or **depth range maximum value** is known.
- Meta features **Sounding Datum** and **Vertical Datum of Data** may overlap.
Distinction: Vertical Datum.

Inland specific Encoding Instructions:

- A) The areas covered by these Metadata Features must be mutually exclusive.
- B) Depth contours and depth areas going across areas which have different values of Sounding Datum, must be divided into several Features at the border of these Metadata Features.
- C) The sounding datum must be constant over large areas. It applies to the attributes **value of sounding** (VALSOU), **depth range minimum value** (DRVAL1), **depth range maximum value** (DRVAL2) and **value of depth contour** (VALDCO).

3.10 Vertical datum of data

IHO Definition: **VERTICAL DATUM OF DATA.** Any level surface (for example Mean Sea Level) taken as a surface of reference to which the elevations within a data set are reduced. Also called datum level, reference level, reference plane, levelling datum, datum for heights. (Adapted from IHO Dictionary – S-32).

The **Vertical Datum of Data** for inland waterways is in most cases not a horizontal plane but a sloping plane.

S-401 Metadata Feature: Vertical Datum of Data (m_vdat) (O)

Primitives: Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
vertical datum	(VERDAT)	3 : mean sea level 10 : Approximate Lowest Astronomical Tide 12 : Mean Lower Low Water 16 : mean high water 17 : mean high water springs 18 : high water 19 : approximate mean sea level 20 : high water springs 21 : mean higher high water 23 : Lowest Astronomical Tide 24 : local datum 25 : international great lakes datum 1985 26 : mean water level 28 : higher high water large tide 29 : nearly highest high water 30 : highest astronomical tide 31 : Local Low Water Reference Level 32 : Local High Water Reference Level 33 : Local Mean Water Reference Level 34 : Equivalent Height of Water (German GIW) 35 : Highest Shipping Height of Water (German HSW) 36 : Reference Low Water Level According to Danube Commission 37 : Highest Shipping Height of Water According to Danube Commission 38 : Dutch River Low Water Reference Level (OLR) 39 : Russian Project Water Level	EN	1,1

		40 : Russian Normal Backwater Level 41 : Ohio River Datum 43 : Dutch High Water Reference Level 44 : baltic sea chart datum 2000 45 : Dutch Estuary Low Water Reference Level (OLW)		
<i>information</i>	(INFORM)	See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
Reported Date	(SORDAT)		TD	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM)		(S) TE	1,1

	(NOBJNM)			
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

† For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

3.10.1 Vertical datum

Vertical (height) datum information is encoded using the Meta feature **Vertical Datum of Data**, or by populating the attribute **vertical datum** on individual geo features. The values encoded in the attributes **elevation**, **height**, **vertical clearance closed**, **vertical clearance fixed**, **vertical clearance open** and **vertical clearance safe** (positive values up) are referenced to the specified datum(s). **vertical datum** must not be encoded on any geo feature instance unless at least one of the above attributes is also encoded on that feature.

The vertical datum of the dataset must be encoded using the Meta feature **Vertical Datum of Data**:

All parts of the dataset containing data must be covered by **Vertical Datum of Data** features, with the attribute **vertical datum** indicating the vertical (height) datum. **Vertical Datum of Data** features must not overlap.

Various height datums may be used within an IENC. For example, different datums may be used for the following:

- altitude of spot heights, height contours, landmarks,
- elevation of lights,
- vertical clearance.

Where different vertical datums are used for the various vertical measurements, the default value given in the metadata for the **Vertical Datum of Data** applies to the first group of the above list. The attribute **vertical datum** on an individual feature applies to the elevation of lights and vertical clearances and must only be populated if different from the value given by **Vertical Datum of Data**.

Remarks:

- Value 13 (low water) for attribute **vertical datum** is only applicable to enclosed (inland) waterways; and must not be used for tidal waters.
- Height contours, going across areas having different values of vertical datum, must be split at the border of these areas.
- Meta features **Vertical Datum of Data** and **Sounding Datum** may overlap.

Distinction: Sounding Datum.

Inland specific Encoding Instructions:

- A) The surfaces covered by these Metadata Features must be mutually exclusive.

3.11 Quality of survey

IHO Definition: **QUALITY OF SURVEY.** An area within which a uniform assessment of the reliability of source survey information exists. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.218, November 2000).

S-401 Metadata Feature: Quality of Survey (M_SREL) (O)

Primitives: Curve, Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
<i>depth range maximum value</i>	(DRVAL2)		RE	0,1
<i>depth range minimum value</i>	(DRVAL1)		RE	0,1
<i>features detected</i>			C	0,1
least depth of detected features measured			(S) BO	1,1
significant features detected			(S) BO	1,1
size of features detected			(S) RE	0,1
<i>full seafloor coverage achieved</i>			BO	0,1
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>line spacing maximum</i>			IN	0,1
<i>line spacing minimum</i>			IN	0,1
<i>measurement distance maximum</i>	(SDISMX)		IN	0,1
<i>measurement distance minimum</i>	(SDISMN)		IN	0,1
quality of horizontal measurement	(QUAPOS)	4 : approximate	EN	0,1
quality of vertical measurement	(QUASOU)	1 : depth known 2 : depth or least depth unknown 3 : doubtful sounding 4 : unreliable sounding 6 : least depth known 7 : least depth unknown, safe clearance at value shown 8 : value reported (not surveyed) 9 : value reported (not confirmed) 10 : maintained depth 11 : not regularly maintained	EN	1,*
<i>scale value maximum</i>	(SCVAL1)	scale value maximum < scale value minimum	IN	0,1
<i>scale value minimum</i>	(SCVAL2)	scale value minimum > scale value maximum	IN	0,1
survey authority	(SURATH)		TE	1,1

survey date range		See clause 2.4.8	C	1,1
date end	(SUREND)		(S) TD	1,1
date start	(SURSTA)		(S) TD	0,1
survey type	(SURTYP)	1 : reconnaissance/sketch survey 2 : controlled survey 4 : examination survey 5 : passage survey 6 : remotely sensed 7 : full coverage 8 : systematic survey 9 : non-systematic survey 10 : inadequately surveyed 11 : spot-sounding survey 12 : acoustically swept survey 13 : mechanically swept survey	EN	0,*
<i>technique of vertical measurement</i>	(TECSOU)	1 : found by echo sounder 2 : found by side scan sonar 3 : found by multi beam 4 : found by diver 5 : found by lead line 6 : Swept by Wire-Drag 8 : swept by vertical acoustic system 9 : found by electromagnetic sensor 10 : photogrammetry 11 : satellite imagery 12 : found by levelling 13 : swept by side scan sonar 15 : found by LIDAR 16 : synthetic aperture radar 17 : hyperspectral imagery 18 : mechanically swept	EN	0,*
<i>information</i>	(INFORM)	See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 [†]
Reported Date	(SORDAT)		TD	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military	(S) EN	0, 1

		10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0, *
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0, *
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0, *

[†] For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

3.11.1 Survey reliability and source of bathymetric data

The survey reliability and/or details of the source surveys used in compilation may be encoded using the Meta feature **Quality of Survey**.

Quality of Survey can apply to bathymetry (for example, underwater rocks), non-bathymetry (for example, navigational aids) and a combination of these (for example, LIDAR survey).

Remarks:

- To express completeness of bathymetric data, the complex attribute **features detected** should be encoded. **features detected** indicates that a systematic method of exploring the seafloor was undertaken to detect significant features. The sub-attributes **size of features detected** and **least**

depth of detected features measured must not be encoded unless the sub-attribute **significant features detected** is set to *True*.

- If it is required to encode a vertical uncertainty value, it must be encoded using the complex attribute **vertical uncertainty** on an instance of the information type **Spatial Quality** (see clause 24.5), associated to the relevant feature(s) point, multipoint and curve geometry, or an instance of the Meta feature **Quality of Bathymetric Data** (see clause 3.8).
- If the attribute **measurement distance maximum** is set to *0* (zero) for the full area of the survey, the attribute **full seafloor coverage achieved** should be set to yes.
- Where populated, the value for the attribute **measurement distance minimum** must not be larger than the value populated for **measurement distance maximum**.
- **quality of horizontal measurement** on the **Quality of Survey** applies to bathymetric data situated within the area, while **quality of horizontal measurement** or **horizontal position uncertainty** on the associated spatial types qualifies the location of the **Quality of Survey** feature itself.
- The attributes **depth range maximum value** and **depth range minimum value** may be used to define the quality of individual surveys at varying depths in the water column, similar to the method used for indicating the overall quality of bathymetry using **Quality of Bathymetric Data** (see clause 3.8).

3.11.2 Quality of sounding

If it is required to encode the quality of sounding, it must be done using the attribute **quality of vertical measurement** on either the **Quality of Survey** or on individual geo features (for example **Sounding**).

The quality of sounding must not be encoded using **quality of vertical measurement** on the depth geo feature, unless it is different from the value of **quality of vertical measurement** encoded on **Quality of Survey** (see Table 11-1 at clause 11.3.1 and Table 13-1 at clause 13.3).

3.11.3 Technique of vertical measurement

If it is required to encode the technique of sounding measurement, it must be done using the attribute **technique of vertical measurement** on either **Quality of Survey** or on individual geo features (for example **Sounding**).

technique of vertical measurement must not be populated with multiple values to indicate the technique of sounding measurement for multiple surveys. **technique of vertical measurement** may be populated with multiple values only where the area is covered by a survey that has used multiple techniques, for example an area covered by a survey using a modern echosounder combined with a sonar or mechanical sweep system.

The technique of sounding measurement must not be encoded using **technique of vertical measurement** on the depth geo feature, unless it is different from the value of **technique of vertical measurement** encoded on an overlapping **Quality of Survey**; and the information is considered to be important to navigation.

Remarks:

- No remarks.

Distinction: Accuracy of Data; Quality of Bathymetric Data.

Inland specific Encoding Instructions:

- A) The **Quality of Survey** for soundings is only given in those areas where detailed depth information is provided. The surface feature shares the geometry with those surfaces.
- B) **Quality of vertical measurement** (QUASOU) = 1 (depth known) has to be used if the depth is known and shown via depth areas.

- C) **Quality of vertical measurement** (QUASOU) = 2 (depth unknown) is used as an feature attribute only in combination with depth surfaces (not with Metadata Feature **Quality of Survey** (M_SREL)) for those areas in the river, which are too shallow for being surveyed by surveying boats and hence no detailed data is available (see 11.8 Unsurveyed Area).
- E) **Quality of vertical measurement** (QUASOU) = 8 (value reported (not surveyed)) must be used as an feature attribute only in combination with depth surfaces (not with Metadata Feature **Quality of Survey** (M_SREL)) especially in cases when parts of the navigable water area are not surveyed but may be deep enough for navigation due to reports from other organisations than the waterways administration (see 11.8 **Unsurveyed Area**).
- F) **Quality of vertical measurement** (QUASOU) = 10 (maintained depth) or **Quality of vertical measurement** (QUASOU) = 11 (depth not regularly maintained) should be used as on feature attribute only in combination with **Depth Area** (DEPARE, depare) – Fairway Depth (not with Metadata Feature **Quality of Survey** (M_SREL)) to indicate the maintenance (see 11.6 Fairway Depth / Project Depth).
- G) **Quality of vertical measurement** (QUAPOS) = 10 (precisely known) has to be used if the positioning during the survey is done by differential GPS signals.
- H) **Survey authority** (SURATH) has to be used to give name of the surveying authority.
- I) **Survey date range** has to be used to encode the period of the survey.
- J) Quotation: "If the attributes **uncertainty fixed** (SOUACC) and **technique of vertical measurement** (TECSOU) are required, they must be encoded on either the metadata feature **Quality of Bathymetric Data** (M_QUAL) or on individual geo features (e.g., **Sounding** (SOUNDG))." (see 3.8 **Quality of Bathymetric Data**)
- K) **Survey type** (SURTYP) = 2 (controlled survey) has to be used if a thorough survey has been done, usually conducted with reference to guidelines (a quality assured survey).

3.12 Update information

IHO Definition: **UPDATE INFORMATION.** The Update Information metadata feature is used to represent a change to the information shown.

S-401 Metadata Feature: Update Information (O)

Primitives: Point, Curve, Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
fixed date range		See clause 2.4.8	C	0,1 [†]
date end	(DATEND)		(S) TD	0,1
date start	(DATSTA)		(S) TD	0,1
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
update number			IN	1,1
update type		1 : insert 2 : delete 3 : modify 4: move	EN	1,1
scale minimum	(SCAMIN)	See clause 2.5.9	IN	0,1
source			TE	0,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Update	Updated Information (see clause 25.16)	Most Meta features and all Geo features	Association	0,*
The Collection	Update Aggregation (see clause 25.16)	Update Information	Aggregation	0,1
The Component	Update Aggregation (see clause 25.16)	Update Information	Association	0,*

[†] For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

fixed date range and/or **scale minimum** are mandatory if **fixed date range** and/or **scale minimum** are populated for the associated Geo feature, and must be identical to the values populated for the associated Geo feature.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

3.12.1 Update information

In S-100 ECDIS, the existing methodology in S-57/S-52 based Inland ECDIS or ECS used to provide, on request, a visual indication to the boatmaster of information that has changed in the System Database when an IENC Update is applied will be implemented for this Edition of S-401. The following guidance, therefore, does not indicate any mandatory requirement for Data Producers or Inland ECDIS or ECS Manufacturers in regard to requirements for Inland ECDIS or ECS performance.

The meta feature **Update Information** is used by the Inland ECDIS or ECS to provide information to the boatmaster of changes that have been applied in an IENC New Edition, or to provide additional information to the boatmaster other than the visual indication when an IENC Update is applied. **Update Information** must be associated, where encoded, with features that have changed using the associations **Updated Information** (see clause 25.16) and **Update Aggregation** (see clause 25.20).

Remarks:

- The mandatory attribute **update number** must be used, if required, to indicate the Update number of the Update dataset that the changed information is included in, as indicated in the file extension of the Update dataset.
- The mandatory attribute **update type** must be used, if required, to indicate the type of update applicable to the feature (insertion, deletion, modification, move). Where the **Update Information** is encoded to cover an area in which numerous changes have occurred (for example in a New Edition), **update type** should be populated with value 3 (modify).
- The complex attribute **information** (see clause 2.4.6) should be used to provide a brief textual description of the changes to the associated feature as included in the Update.
- The process of moving a segment of a curve or edge of a surface feature via an IENC Update requires the two-step application of the deletion of the segment at the original position and the insertion of the new segment in the new position. Where required, in order to indicate the move of a segment by IENC Update, three **Update Information** features should be created and associated, if required, as follows:
 - An **Update Information** feature having **update type** = 2 (delete) using the geometry of the deleted segment at the original position;
 - An **Update Information** feature of type curve having **update type** = 1 (insert) associated to the inserted segment at the new position;
 - An **Update Information** feature having no geometry and **update type** = 4 (move) associated to the above “delete” and “insert” **Update Information** features using the association **Update Aggregation** (see clause 25.20).
- The association **Update Aggregation** may also be used to group several related updates, for example changes to a routeing measure or aids to navigation range system. Where this is done, the **Update Information** forming the collection (container) end of the relationship should have no geometry and have **update type** = 3 (modify).
- Where the changed information is related to an information type, the **Update Information** should be associated with the features to which the information type is associated.
- The attribute **source** may be used to indicate the related paper chart Notice to Mariner's number.

- At each New Edition of an IENC cell, **Update Information** features which are no longer relevant must be deleted; and for the next Update to an IENC cell **Update Information** features included in the previous Update dataset should be considered for deletion. Where a new Update impacts a feature that has previously been updated, any existing instance of **Update Information** associated to the feature must be deleted as part of the new Update; this must be done by deleting the existing **Update Information** from the dataset.
- The creation of **Update Information** Meta feature instances on request and the corresponding **Updated Information** and **Update Aggregation** association instances may be substantively automated in IENC production systems and associated databases, with automated population of the mandatory attributes **update number** and **update type** based on the change made to the data; and the complex attribute **fixed date range** and attribute **scale minimum** based on the attribution of the associated geo feature. The optional creation of these features and any additional information populated for **Update Information** is at the discretion of the Data Producer.

Distinction: Information Area; Caution Area.

Inland specific Encoding Instructions:

- A) If the update information should only be displayed at certain scales the attribute **scale minimum** (SCAMIN) has to be encoded.

4 Geo Features – Magnetic Data

4.1 Magnetic variation

IHO Definition: **MAGNETIC VARIATION.** The angle between the magnetic and geographic meridians at any place, expressed in degrees east or west to indicate the direction of magnetic north from true north. Also called magnetic declination. (IHO Dictionary – S-32).

S-401 Geo Feature: Magnetic Variation (MAGVAR) (O)

Primitives: Point, Curve, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
reference year for magnetic variation	(RYRMGV)	See clause 2.4.8 (YYYY----)	TD	1,1
value of annual change in magnetic variation	(VALACM)	+/- minutes. Positive (unsigned) value indicates easterly. Negative value indicates westerly	RE	1,1
value of magnetic variation	(VALMAG)	+/- degrees. Positive (unsigned) value indicates easterly. Negative value indicates westerly	RE	1,1
scale minimum	(SCAMIN)	22000 or see clause 2.5.9	IN	1,1
<i>information</i>	(INFORM)	See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
Reported Date	(SORDAT)		TD	0, 1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port	(S) EN	0, 1

		5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0, *
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The updated Object	Updated Information (see clause 25.16)	Update Information	Association	0, *
-	Additional Information (see clause 25.1)	Nautical Information	Association	0, *
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0, *

[†] For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

4.1.1 Magnetic variation

Of the various magnetic data, magnetic variation is the most important element for the boatmaster. Until a world magnetic model is universally available for inclusion in Inland ECDIS or ECS, if it is required to encode magnetic variation, it must be done using the feature **Magnetic Variation**. As a minimum, updates to the magnetic variation should be supplied to coincide with changes of epoch (that is, every five years).

Remarks:

- There remains a requirement to include magnetic variation information in ENCs whilst SOLAS regulations include the requirement for a magnetic compass and deviation card. User feedback indicates that it can be difficult to access magnetic variation information in Inland ECDIS or ECS where it has been encoded using the point or curve primitive. In order to make magnetic variation information easily accessible to Inland ECDIS or ECS users, it is recommended to encode this information as Magnetic Variation features of type surface. Encoding this information using the surface primitive ensures that the user can interrogate the IENC data using the Inland ECDIS or ECS Pick Report function at any chart location to identify the value of magnetic variation at that location.
- The mandatory attribute reference year for magnetic variation must be used to populate the year value only (see clause 2.4.8 for format of date type attributes).
- Magnetic models are typically updated every five years (for example 2005, 2010... termed epochs). Magnetic variation can be calculated from computer models, or derived from charts produced by certain Hydrographic Offices or mapping authorities, which show the spatial distribution of magnetic variation values worldwide for the current epoch, by means of lines of equal magnetic variation (termed isogonals). The rate-of-change curves, which are over-printed on such charts, enable values for any point to be extrapolated for any time within the current epoch.
- Magnetic variation information in high latitudes (polar regions) is highly variable and unreliable, and as such is not normally used for navigation. It is therefore not considered to be a requirement to include magnetic variation information in IENCs covering polar waters.

Distinction:

Inland specific Encoding Instructions:

- A) Until a world magnetic model is universally available for inclusion in Inland ECDIS or ECS, if it is required to encode magnetic variation, it must be done using the Geo Feature **Magnetic Variation** (MAGVAR). As a minimum, updates should be supplied to coincide with changes of epoch (i.e. every five years).
- B) For **value of magnetic variation** (VALMAG) and **value of annual change in magnetic variation** (VALACM) a positive value, i.e. unsigned, indicates a variation (change) in an easterly direction and a negative value indicates a variation (change) in a westerly direction.

5 Geo Features – Natural Features

The use of Global Navigation Satellite Systems (GNSS) as an integral component of Inland ECDIS or ECS has raised questions as to the level of topographic detail that is required in IENCs to enable safe navigation using Inland ECDIS or ECS. When determining the topographic information necessary for inclusion in IENC, all operational conditions of vessels must be taken into consideration, including the potential for corruption or failure of a vessel's GNSS reception. Such a failure would require the boatmaster to navigate by fixing their position using traditional methods, necessitating a sufficient level of depiction of topographic detail in the IENC to facilitate navigation using these methods, appropriate to the Navigational Purpose of the IENC.

In addition, boatmasters will continue to use visual or radar fixing as an independent method of confirming the position of their vessel as shown on the Inland ECDIS or ECS, in order to gain a greater level of confidence in terms of their navigation.

Encoders are advised, therefore, that when determining the level of depiction of topographic detail required for IENC, this should be done in accordance with the following principles:

- The types of features charted and the distance inland to which they are shown will vary with the optimum display scale of the IENC data, type of terrain, availability of source data and, possibly, adequacy of regular navigational aids. The significance to the boatmaster must be judged by the requirements of both visual and radar navigation.
- The boatmaster sees the coast in profile; the cartographer compiles it in plan and must always be aware that the boatmaster's interest in land detail is at its greatest at the coastline and falls off rapidly inland. On a low-lying coast, even minor clues to position near the coast, for example sand dunes, hillocks, low bluffs, may be very useful on most detailed IENC datasets. On steep coasts with deep water close inshore, traffic is likely to be concentrated off projecting points of land, and the nature of each headland must be made clear, whether it has vertical cliffs, or a sloping or low profile, for example.
- Off coasts inadequately marked by navigational aids, detailed topography in the coastal belt will allow the boatmaster to clear dangers with the aid of improvised visual transits of charted topographical features.

No definite standards can be stated but the following principles should be observed:

- The density of topographic detail shown should be kept to a minimum consistent with providing navigators with all identifiable features and with a general picture of the relief as far as the probable skyline. This practice should enable landmarks to stand out from less important detail.
- Treatment of detail should vary with distance inland, for example inconspicuous features such as marshes and minor lakes and streams should be shown only when within about a mile of the coast.

Additional guidance regarding the level of depiction of topographic detail in regard to specific features is included in the following clauses.

5.1 Cliffs

A coast backed by rock or earth cliffs gives a good radar return and is useful for visual identification from a considerable distance off, where cliffs alternate with low lying coast along the shoreline. Where cliffs are prominent features they should be encoded on the larger optimum display scale for the IENC data; as an exception,

where cliffs predominate over extensive stretches of coastline, it may be neither feasible nor particularly useful to insert a cliff throughout. Cliff top heights are useful for calculating or estimating distance off, (for clearing inshore dangers) and should be encoded where possible.

If it is required to encode a non-coastal cliff, it must be done using the feature **Sloping Ground** (see clause 5.10) and/or using the feature **Slope Topline** (see clause 5.11), with attribute **category of slope = 6 (cliff)**. For example:

Sloping Ground may be used at large scale to indicate the horizontal extent of the cliff.

Slope Topline should be used on its own to encode cliffs at small scale, or in conjunction with **Sloping Ground** to indicate the crest of the cliff when it is considered useful to know its elevation, and/or to encode a cliff on land distant from the coastline.

Remarks:

- When the cliff is coincident with the coastline, a **Coastline** feature, with attribute **category of coastline = 1 (steep coast)** should be encoded, and there should be no **Sloping Ground** or **Slope Topline** encoded.

5.2 Cuttings and embankments

If it is required to encode cuttings and embankments, this must be done in the same way as cliffs; using **Sloping Ground** and/or **Slope Topline** features (see clauses 5.10 and 5.11), with attribute **category of slope = 1 (cutting)** or **2 (embankment)**.

Remarks:

- Cuttings and embankments should be encoded only when likely to be visible from the water.

5.3 Coastline

IHO Definition: **COASTLINE.** The line where shore and water meet. Shoreline and coastline are generally used synonymously. (IHO Dictionary – S-32).

The official name ‘**Coastline**’ is a synonym for the term ‘shoreline’ commonly used in inland navigation.

S-401 Geo Feature: Coastline (COALNE)

Primitives: Curve

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>
		

S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of coastline	(CATCOA)	1 : steep coast 2 : flat coast 3 : Sandy Shore 4 : Stony Shore 5 : Shingly Shore 6 : glacier, seaward end 7 : mangrove 8 : marshy shore 9 : Coral Reef 10 : ice coast 11 : Shelly Shore	EN	0,1
colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 6 : yellow 7 : grey 8 : brown 11 : orange 13 : pink	EN	0,*
elevation	(ELEVAT)		RE	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>nature of surface</i>	(NATSUR)	1 : mud 2 : clay 3 : silt 4 : sand 5 : stone 6 : gravel 7 : pebbles 8 : cobbles 9 : rock 11 : lava 14 : coral 17 : shells	EN	0,*
<i>radar conspicuous</i>	(CONRAD)		BO	0,1
<i>visual prominence</i>	(CONVIS)	1 : visually conspicuous 2 : not visually conspicuous 3 : prominent	EN	0,1
<i>information</i>	(INFORM)	See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
<i>pictorial representation</i>	(PICREP)	See clause 2.4.12.2	TE	0,1
Scale Minimum	(SCAMIN)	[EUR: 45000; US: 300000] or see clause 2.5.9	IN	1, 1
Vertical Uncertainty	(VERACC)	[xx.xx] (metres), e.g., 1.54	C	0, 1
Uncertainty Fixed	(POSACC) (SOUACC) (VERACC)		(S) RE	1, 1
Uncertainty Variable Factor			(S) RE	0, 1
Category of Temporal Variation	(CATTEV)	4 : Likely to Change 5 : Unlikely to Change 6 : Unassessed	EN	0, 1
Reported Date	(SORDAT)		TD	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance	(S) EN	0, 1

		15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0, *
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0, *
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
	Additional Information (see clause 25.1)	Nautical Information	Association	0, *
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0, *

† Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

5.3.1 Coastline

Natural sections of coastlines, lakeshores and riverbanks should be encoded as **Coastline**, whereas artificial sections of coastlines, lakeshores, riverbanks, canal banks and basin borders should be encoded as **Shoreline Construction** (see clause 8.6). The exception to this general rule is when a lake, river, canal, or basin is not navigable at the optimum display scale for the IENC data, in which case the boundary of the lake, river, canal, or basin must not be encoded as **Coastline** or **Shoreline Construction** as the boundary of these specific areas (**Lake**, **River**, **Canal**, **Dock Area**, **Lock Basin**) create the portrayal of the bank or shoreline.

Coastline and **Shoreline Construction** features form the border of the **Land Area** feature (see clause 5.4).

5.3.2 Natural coastline

Spatial types associated with coastlines considered to be inadequately surveyed at the optimum display scale for the IENC data should be encoded using spatial attribute **quality of horizontal measurement = 4** (approximate).

If it is required to encode a description of the nature of the coastline, it must be done using the attributes **category of coastline** and **nature of surface**. Other surface features may be used to describe the land region adjacent to the coastline (see clause 5.11).

A steep coast may give a good radar return and is useful for visual identification from a considerable distance off, particularly where cliffs alternate with low lying coast along the shoreline.

Remarks:

- **Coastline** must only exist at the boundary of **Land Area** of type surface.
- **Coastline** and **Shoreline Construction** of type curve must not overlap. Similarly, **Coastline** should not share an edge with a **Shoreline Construction** of type surface (see clause 8.6) having attribute **water level effect** undefined or populated with the values 2 (always dry) or 1 (partly submerged at high water), which is covered by **Land Area**.
- If the seaward edge of an encoded saltpan area is coincident with the coastline, it should be encoded using **Coastline**, with **category of coastline = 2** (flat coast).
- If the seaward edge of a marsh area or glacier is coincident with the coastline, the coastline should be encoded as **Coastline**, with attribute **category of coastline = 8** (marshy shore) or **9** (glacier, seaward end). The coastline's spatial type should have the attribute **quality of horizontal measurement = 4** (approximate). If it is required to encode the area behind the coastline, this must be done using a **Land Region** feature (for marsh – see clause 5.9)).
- If it is required to encode mangroves in the intertidal area, this should be done using an **Obstruction** feature (see clause 13.6). However, on smaller optimum display scale ENC datasets where the mangroves are required to be encoded to indicate the seaward edge of a mangrove area only as the “apparent” coastline, this must be done using **Coastline** with **category of coastline = 7** (mangrove). The coastline's spatial type should have the attribute **quality of horizontal measurement = 4** (approximate).
- Where the source indicates the top of a cliff is coincident with the coastline at the optimum display scale of the IENC data, a **Coastline** feature, with **category of coastline = 1** (steep coast) should be encoded. In such cases, there should be no **Slope Topline** or **Sloping Ground** features encoded, in order to avoid clutter. If it is required to indicate that such a section of the coastline provides a good radar return, it must be done using attribute **radar conspicuous** on the **Coastline** feature. If it is required to encode a section of the coastline that is visually conspicuous, it must be done using attribute **visual prominence** on the **Coastline** feature.
- If the source indicates that the top of a coastal cliff is offset inshore from the coastline at the optimum display scale of the IENC data, a **Slope Topline** feature (see clause 5.11) and/or a **Sloping Ground** feature (see clause 5.10) may be encoded. In such cases, the **Coastline** feature should not have a value populated for **category of coastline**. If it is required to indicate that such a section of the coastline provides a good radar return, it must be done using attribute **radar conspicuous** on the **Slope Topline** and/or **Sloping Ground** feature. If it is required to encode a section of the coastline that is visually conspicuous, it must be done using attribute **visual prominence** on the **Slope Topline** and/or **Sloping Ground** feature.

Distinction: Shoreline Construction; Slope Topline; Sloping Ground.

Inland specific Encoding Instructions:

- A) EUR: The **Coastline** (COALNE) respectively shoreline should be extracted from data collected at mean water conditions, if possible.
- B) US: The **Coastline** (COALNE) respectively shoreline is project specific: in pool areas, project pool is used; in open water areas, shoreline should be extracted at low water conditions.

- C) When the cliff is coincident with the coastline, a **Coastline** (COALNE) feature with the attribute **category of coastline** (CATCOA) = 1 (steep coast) should be encoded and there should be no **Sloping Ground** (SLOGRD) or **Slope Topline** (SLOTOP) encoded.

5.4 Land area

IHO Definition: LAND AREA. The solid portion of the Earth's surface, as opposed to sea, water. (IHO Dictionary – S-32).				
S-401 Geo Feature: Land Area (LNDARE) (M)				
Primitives: Point, Curve, Surface				
Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
				
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
condition	(CONDTN)	1 : under construction 3 : under reclamation 5 : planned construction	EN	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
interoperability identifier		MRN (see clause 27.161)	URN	0,1
reported date	(SORDAT)	See clause 2.4.8	TD	0,1
status	(STATUS)	18 : existence doubtful	EN	0,1
scale minimum	(SCAMIN)	[for point or curve EUR: 22000 US: 300000] or see clause 2.5.9	IN	0,1
information	(INFORM)	See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
Pictorial Representation	(PICREP)		TE	0, 1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard	(S) EN	0, 1

		8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0, *
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0, *
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
	Additional Information (see clause 25.1)	Nautical Information	Association	0, *
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0, *

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

5.4.1 Land area

Land areas that are never covered by the sea must be encoded using the feature **Land Area**. **Land Area** features of type surface are part of the Skin of the Earth.

Rivers, canals, lakes, basins and docks, which are not navigable at the optimum display scale for the IENC data, must be encoded on top of **Land Area** features (see clause 5.4).

Remarks:

- If it is required to describe the natural scenery of the land, it must be done using the feature **Land Region** (see clause 5.8).
- **Land Area** is usually of type surface; it may, however, be of type point (for example islet, rock that does not cover), or of type curve (for example islet, offshore bar, isthmus).
- **Land Area** of type curve or point must not be encoded on top of **Land Area** of type surface, unless it is also covered by a **Lake, River, Dock Area, Lock Basin** or **Canal** feature of type surface.
- The limits of a **Land Area** of type surface must share the geometry of at least one of the following features:
 - **Coastline, Shoreline Construction, Gate, Dam** of type curve;
 - **Data Coverage, Dolphin, Exceptional Navigation Structure, Gate, Dam, River, Tunnel, Dry Dock, Canal, Lake, Lock Basin, Lock Basin Part, Dock Area, Harbour Basin, Land Area** of type surface;
 - **Causeway, Shoreline Construction, Wreck, Obstruction, Pylon/Bridge Support** of type surface; and having attribute **water level effect** = 1 (partly submerged at high water), 2 (always dry), 4 (covers and uncovers), 5 (awash), 6 (subject to inundation or flooding), 8 (above mean water level) or 9 (below mean water level).

5.4.2 Rocks which do not cover (islets)

A surface feature must be encoded using:

- A **Land Area** feature of type surface (mandatory)
- **Coastline** or **Shoreline Construction** features of type curve (mandatory)
- **Land Elevation** features of type curve and/or point (optional)

A curve feature must be encoded using:

- A **Land Area** feature of type curve (mandatory)
- **Land Elevation** features of type point (optional)

A point feature must be encoded using:

- A **Land Area** feature of type point (mandatory)
- A **Land Elevation** feature of type point (optional)

Distinction: Canal; Coastline; Depth Area; Lake; Land Region; River; Seabed Area; Shoreline Construction; Vegetation.

Inland specific Encoding Instructions:

- A) US: Encode the land area up to the defined 1000 meter buffer zone or the distance within the radar zone for IENC charts.
- B) Curve and Point features may only be used in small-scale charts.
- C) **scale minimum (SCAMIN)** may not be encoded for type Surface, but have to be encoded for type Curve and Point (see also 2.5.9).

5.5 Land elevation

IHO Definition: **LAND ELEVATION.** An elevation is the vertical distance of a point or a level, on, or affixed to, the surface of the earth, measured from a specified vertical datum. (Adapted from IHO Dictionary – S-32).

S-401 Geo Feature: Land Elevation (LNDELV) (O)

Primitives: Point, Curve

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
elevation	(ELEVAT)		RE	1,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
visual prominence	(CONVIS)	1 : visually conspicuous 2 : not visually conspicuous 3 : prominent	EN	0,1
scale minimum	(SCAMIN)	EUR: 12000 US: 18750 or see clause 2.5.9	IN	1,1
information	(INFORM)	See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
Reported Date	(SORDAT)		TD	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental	(S) EN	0, 1

		13 : Fishery 14 : Finance 15 : Maritime 16 : Customs		
....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

5.6.1 Height contours, spot heights

It is assumed that boatmasters will understand most methods of representation of relief with little difficulty. In general, it is assumed that Producers will choose the representation of relief most suitable to the terrain being charted and the navigational requirements. It is therefore left to national discretion to:

- omit all relief representation, except dykes and sea walls;
- omit all relief representation, except spot heights and cliffs;
- show relief by contours (and spot heights); or
- show relief by form lines (and spot heights).

Spot heights on IENC datasets should be confined to summits of hills, mountains and cliffs, particularly on datasets from which contours and form lines have been omitted; boatmasters will generally assume that heights selected for IENC are summits.

If it is required to encode a height contour or spot height, it must be done using the feature **Land Elevation**.

Land Elevation features must be covered by a **Land Area** feature of type surface; or a **Wreck** feature of type surface having attribute **water level effect** = 1 (partially submerged at high water) or 2 (always dry); or fall on a **Land Area** feature of type curve; or share the geometry of a **Land Area** of type point or a **Wreck** feature of type point having attribute **water level effect** = 1 (partially submerged at high water) or 2 (always dry).

Spatial types associated with approximate contours or spot heights should be encoded using the attribute **quality of horizontal measurement** = 4 (approximate).

Remarks:

- Where it would not be worthwhile to contour IENC data of smaller optimum display scale, form lines (emphasizing a few 'remarkable' hills) and/or spot heights may be used to emphasize individual features.
- Contours should reflect the nature of the topography; that is, they should not be rounded or smoothed (by generalisation) when they should really be angular.
- The contour interval must be uniform for any dataset, or series of datasets of the same or similar optimum display scale, except that the lowest contour may be a supplementary one, for example 25 metres where the basic interval is every 50 metres; or 10 metres where the basic interval is every 25 metres. Ideally the contour interval should be chosen so that not more than 10 contours are needed for the full range of height on a single dataset or particular series of datasets (for clarity and economy).
- If it is required to encode the elevation of an observation spot, benchmark or horizontal control station, it must be done using **Land Elevation**. If it is required to encode the elevation of a triangulation mark or boundary mark, it must be done using the feature **Landmark** (see clause 7.2).

Distinction: Slope Topline; Sloping Ground.

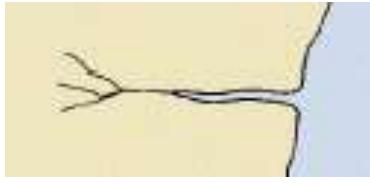
Inland specific Encoding Instructions:

5.6 River

IHO Definition: **RIVER.** A relatively large natural stream of water. (IHO Dictionary – S-32)
This feature is used for non-navigable rivers.

S-401 Geo Feature: River (RIVERS) (O)

Primitives: Curve, Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>
		

S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>status</i>	(STATUS)	5 : periodic/intermittent	EN	0,1
scale minimum	(SCAMIN)	[EUR: 45000; US: 60000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Reported Date	(SORDAT)		TD	0, 1

Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0, *
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0, *
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
	Additional Information (see clause 25.1)	Nautical Information	Association	0, *
† Complex attribute feature name , sub-attribute name usage is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.				
For each instance of information , at least one of the sub-attributes file reference or text must be populated.				

5.6.1 Rivers

Inland navigable waters must be compiled as fully as practicable, consistent with the optimum display scale of the IENC data. Other rivers should be compiled only in a limited way to assist in providing a general indication of the topography (except close to the coastline where they may be of direct significance to the boatmaster).

If it is required to encode a non-navigable river, stream or creek, it must be done using the feature **River**.

Remarks:

- If the river is navigable at the optimum display scale for the IENC data, it must be encoded using the feature **Depth Area**, **Dredged Area** (see clause 11.4) or **Unsurveyed Area**, and the riverbanks must be encoded using the feature **Coastline** or **Shoreline Construction**. The river must not be encoded as a **River** feature in this case. If it is required to encode the name of the river, it must be done using a **Sea Area/Named Water Area** feature with attribute **category of sea area** = 53 (river).
- Where the river is navigable at the optimum display scale for the IENC data, special consideration should be given to encoding features specific to the river such as minimum depths within the navigable area; overhead clearances; distances along the river; and locks and lock gates (and any associated traffic signals).
- If it is required to encode a river that is not navigable at the optimum display scale for the IENC data, it must be done using **River**, covered by a **Land Area** feature. The name of the river should be encoded using the complex attribute **feature name** on the **River** feature.
- Intermittent rivers are those that are dry most of the time, and where required must be encoded as a **River** feature with attribute **status** = 5 (periodic/intermittent).
- If it is required to encode an island in a non-navigable river encoded on **Land Area**, this must be done by encoding a “hole” in the **River** feature if the island is a surface at the optimum display scale for the IENC data, or encoding **Land Area** of type point if the island is a point at the optimum display scale for the IENC data. Encoders must not encode **Land Area** surfaces on top of **Land Area** surfaces.
- If it is required to encode an island in a non-navigable river encoded on **Unsurveyed Area**, this must be done by encoding a “hole” in both the **River** and **Unsurveyed Area** features and replacing with **Land Area** if the island is a surface at the optimum display scale for the IENC data, or encoding **Land Area** of type point if the island is a point at the optimum display scale for the IENC data. Encoders must not encode **Land Area** surfaces on top of **Unsurveyed Area** surfaces.
- Some dry riverbeds, known as wadi's, may be prominent topographic features. If it is required to encode a wadi, it should be done using a **Land Region** feature (see clause 5.8), with the name of the wadi encoded using the complex attribute **feature name**.

Distinction: Canal; Lake; Sea Area/Named Water Area; Tideway; Waterway Area.

Inland specific Encoding Instructions:

- A) Surface features should not extend into curve features as the river narrows; end where area designation ends.
- B) Rivers that can be used for navigation by e.g. pleasure craft should be encoded as **Depth Area** (DEPARE, depare) or **Unsurveyed Area** (UNSARE).

5.7 Lake

IHO Definition: **LAKE.** A large body of water entirely surrounded by land. (IHO Dictionary – S-32).

S-401 Geo Feature: Lake (LAKARE) (O)

Primitives: Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
elevation	(ELEVAT)		RE	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
interoperability identifier		MRN (see clause 27.161)	URN	0,1
status	(STATUS)	5 : periodic/intermittent	EN	0,1
scale minimum	(SCAMIN)	[EUR: 90000; US: 300000] or see clause 2.5.9	IN	1,1
information	(INFORM)	See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
Pictorial Representation	(PICREP)		TE	0, 1
Reported Date	(SORDAT)		TD	0, 1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health	(S) EN	0, 1

		7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0, *
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0, *
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
	Additional Information (see clause 25.1)	Nautical Information	Association	0, *
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0, *

† Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

5.10.1 Lakes

Inland navigable waters must be compiled as fully as practicable, consistent with the optimum display scale of the IENC data. Other lakes should be compiled only in a limited way to assist in providing a

general indication of the topography (except close to the coastline where they may be of direct significance to the boatmaster).

If it is required to encode a non-navigable lake, it must be done using the feature **Lake**.

Remarks:

- If the lake is navigable at the optimum display scale for the IENC data, it must be encoded using the feature **Depth Area**, **Dredged Area** (see clause 11.4) or **Unsurveyed Area**, and the lake shore must be encoded using the feature **Coastline** or **Shoreline Construction**. The lake must not be encoded as a **Lake** feature in this case. If it is required to encode the name of the lake, it must be done using a **Sea Area/Named Water Area** feature, with attribute **category of sea area** = 52 (lake).
- If it is required to encode a lake that is not navigable at the optimum display scale for the IENC data, it must be done using **Lake**, covered by a **Land Area** feature. The name of the lake should be encoded using the complex attribute **feature name** on the **Lake** feature.
- If it is required to encode an island in a non-navigable lake encoded on **Land Area**, this must be done by encoding a “hole” in the **Lake** feature if the island is a surface at the optimum display scale for the IENC data, or encoding **Land Area** of type point if the island is a point at the optimum display scale for the IENC data. Encoders must not encode **Land Area** surfaces on top of **Land Area** surfaces. If it is required to encode an island in a non-navigable lake encoded on **Unsurveyed Area**, this must be done by encoding a “hole” in both the **Lake** and **Unsurveyed Area** features and replacing with **Land Area** if the island is a surface at the optimum display scale for the IENC data, or encoding **Land Area** of type point if the island is a point at the optimum display scale for the IENC data. Encoders must not encode **Land Area** surfaces on top of **Unsurveyed Area** surfaces.
- Intermittent lakes are those that are dry most of the time, and where required must be encoded as a **Lake** feature with attribute **status** = 5 (periodic/intermittent).

Distinction: Canal; Depth Area; River; Waterway Area.

Inland specific Encoding Instructions:

5.8 Land region

IHO Definition: LAND REGION. An area of natural or cultivated scenery defined by its geographical characteristics and may be known by its proper name. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.92, November 2000).

For IENCs: Land Areas adjacent to the waterway that are significant for navigation reference.

S-401 Geo Feature: Land Region (LNDRGN) (O)

Primitives: Point, Curve, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of land region	(CATLND)	1 : fen 2 : marsh 3 : bog 4 : heathland 5 : mountain range 6 : lowlands 7 : canyon lands 8 : paddy field 9 : agricultural land 10 : savanna/grassland 11 : parkland 12 : swamp 13 : landslide 14 : lava flow 15 : salt pan 16 : moraine 17 : crater 18 : cave 19 : rock column or pinnacle 20 : cay 21 : wadi	EN	0,* †
feature name		See clause 2.5.8	C	1,* †
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
interoperability identifier		MRN (see clause 27.161)	URN	0,1

<i>nature of surface</i>	(NATSUR)	1 : mud 2 : clay 3 : silt 4 : sand 5 : stone 6 : gravel 7 : pebbles 8 : cobbles 9 : rock 11 : lava 14 : coral 17 : shells 18 : boulder	EN	0,*
<i>water level effect</i>	(WATLEV)	1 : partly submerged at high water 6 : subject to inundation or flooding	EN	0,1
scale minimum	(SCAMIN)	[EUR: 45000; US: 60000 For arrival points: 45000] or see clause 2.5.9	IN	1,1
<i>information</i>	(INFORM)	See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
<i>Condition</i>	(CONDTN)	1 : Under Construction 2 : Ruined 3 : Under Reclamation 5 : Planned Construction	EN	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Reported Date	(SORDAT)		TD	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication	(S) EN	0, 1

		7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data		
.....Source	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] At least one of the attributes **category of land region** or **feature name** must be populated.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

5.8.1 Natural sceneries

If it is required to describe the natural scenery of the land, or to give the geographic name of an area on land, it should be encoded using the feature **Land Region**.

Remarks:

- This feature has a use similar to that of the feature **Sea Area/Named Water Area** (see clause 9.1), but for the land.
- Sand dunes, hills and cliffs must be encoded, where required, using the feature classes **Sloping Ground** and/or **Slope Topline** (see clauses 5.10 and 5.11).
- A **Land Region** surface should be bounded, if possible, by existing curves used by other features (for example **Coastline**). If necessary, however, this surface may be bounded by other curves created to close the surface, or to describe a new surface.
- For named capes, points, peninsulas and other types of **Land Region** where there is no specific value for the attribute **category of land region**, the generic term “Cape”, “Point”, “Peninsula”, etc

may be included on the complex attribute **feature name**, unless the name has been populated on an underlying **Land Area**, in which case **Land Region** should not be encoded.

- **Land Region** features of type surface may overlap.
- For additional guidance on encoding geographic names, see clause 2.5.8.

5.8.1.1 Marsh

If it is required to encode a marshy area behind the coastline, it must be done using a **Land Region** feature, with attribute **category of land region** = 2 (marsh).

If the seaward edge of a marsh area is coincident with the coastline, the coastline should be encoded as a **Coastline** feature, with attribute **category of coastline** = 8 (marshy shore), and the coastline's spatial type should have the attribute **quality of horizontal measurement** = 4 (approximate) for the visible coastline.

5.8.1.2 Salt pans

If it is required to encode an area on land in which seawater is evaporated, it must be done using a **Land Region** feature, with attribute **category of land region** = 15 (salt pan) covered by a **Land Area** feature (that is, the salt pan must not form a hole in the land area).

If the seaward edge of an encoded salt pan area is coincident with the coastline, this edge should also be encoded using a **Coastline** feature, with attribute **category of coastline** = 2 (flat coast).

5.8.1.3 Lava flow

If it is required to encode a lava flow, it must be done using a **Land Region** feature, with attribute **category of land region** = 14 (lava flow).

If the seaward edge of an encoded lava flow area is coincident with the coastline, this edge should also be encoded using a **Coastline** feature (see clause 5.3), with attribute **nature of surface** = 11 (lava). If the source indicates that the lava flow is active, the coastline's spatial type should have the attribute **quality of horizontal measurement** = 4 (approximate).

Distinction: Land Area; Sea Area/Named Water Area; Slope Topline; Sloping Ground; Vegetation.

Inland specific Encoding Instructions:

- A) Land Areas adjacent to the waterway that are significant for navigation reference shall be encoded as **Land Region** (LNDRGN). Examples are landings, islands, points, bends, and any land location that should have a label readily displayed for users of the IENC.
 - B) US: Use state and county abbreviations in **feature name** (OBJNAM), where applicable.
 - C) US: Preferred naming will include State abbreviation on towns and cities.
 - D) **Land Area** (LNDARE) has to be coded underneath **Land Region**
 - E) Use **Land Region** (LNDRGN) (P) to display the name only at the location where the point was placed. Use **Land Region** (LNDRGN) (S) if display of name is desired along water area's entire expanse.
 - F) US: Any important navigation notes that should always be shown on the IENC should be encoded as **Land Region** (LNDRGN) (P) on land or **Sea Area** (SEAARE) (P) features in the water.
 - G) Switching yards and groups of spur lines should be coded as **Land Region** (LNDRGN) (S) features. If appropriate, code **information** (INFORM) = Switching yard. **Feature name** (OBJNAM) may be encoded with the railroad name.
 - H) Use **Land Region** (LNDRGN) for boat ramps that are not functional but are common landmarks or locations for reference.
- Feature name** (OBJNAM) shall be encoded with the name + "Boat Ramp".

5.9 Vegetation

IHO Definition: **VEGETATION.** Plants collectively or individually, especially those dominating a particular area or habitat. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

S-401 Geo Feature: Vegetation (VEGATN) (C)

Primitives: Point, Curve, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol
		

S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of vegetation	(CATVEG)	3 : bush 4 : deciduous wood 5 : coniferous wood 6 : wood in general (inc. mixed wood) 11 : reed 13 : tree in general 14 : evergreen tree 15 : conifer tree 16 : palm tree 17 : nipa palm tree 18 : casuarinas tree 19 : eucalypt tree 20 : deciduous tree 22 : filao tree	EN	1,1
elevation	(ELEVAT)		RE	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
height	(HEIGHT)		RE	0,1
interoperability identifier		MRN (see clause 27.161)	URN	0,1
vertical length	(VERLEN)		RE	0,1
visual prominence	(CONVIS)	1 : visually conspicuous 2 : not visually conspicuous 3 : prominent	EN	0,1
scale minimum	(SCAMIN)	[EUR: 12000; US: 18750] or see clause 2.5.9	IN	1,1

<i>information</i>	(INFORM)	See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 [†]
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Reported Date	(SORDAT)		TD	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity

The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

5.9.1 Vegetation

In most areas the vegetation cover is of negligible importance on charts with the exception of:

- Areas where trees or marsh form the apparent coastline;
- Isolated trees or clumps of trees forming landmarks;
- Where, near the coast, wooded areas alternate with areas without tree cover and so may assist in identifying headlands or other stretches of coastline.

The following features should be omitted from even the largest optimum display scale IENC data:

- Grassland, cultivated fields (including paddy fields), bushes.
- Trees along roads, fences, ditches, and scattered trees (unless landmarks).
- Woodland cover within urban areas (unless adjacent to the coast).
- Woodland cover which is the general ground cover and therefore useless for identification of position.

If it is required to encode an isolated tree used as a landmark, it must be done using a **Vegetation** feature, with attribute **category of vegetation** = 13 to 22.

Remarks:

- The attribute **height** is used to encode the approximate altitude of the highest point of the top of the vegetation. Where the source shows an island with the approximate height of the top of the vegetation above height datum, a **Vegetation** feature should be encoded co-incident with the **Land Area** feature of the island, with attribute **height** corresponding to the value shown on the source.
- Where it is required to encode a mangrove area or tree located in the intertidal area, this should be done using the feature **Obstruction** (see clauses 13.6 and 13.6.1.1), with attribute **category of obstruction** = 23 (mangrove). Where it is required to encode the generalised seaward edge only of a mangrove area to represent the “apparent” coastline, this must be done using the feature **Coastline** (see clause 5.3).

Distinction: Seabed Area; Seagrass; Weed/Kelp.

Inland specific Encoding Instructions:

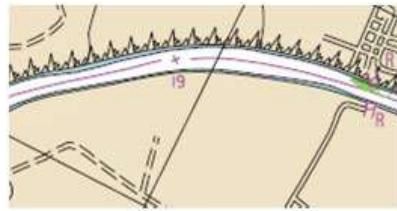
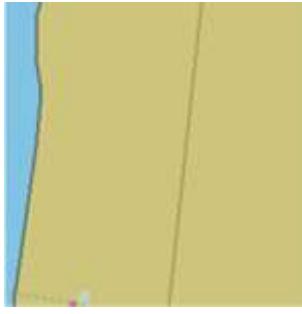
- A) Vegetation areas and trees shall only be used on a limited level, mostly in case they are visual conspicuous to the boatmasters.
- B) In case trees or woods block visibility of objects, which are of relevance for navigation, they shall be encoded.
- C) In case large areas of reed exist and significantly mask a coastline or canal entrance, **category of vegetation** (CATVEG) = 11 (reed) shall be encoded.

5.10 Sloping ground

IHO Definition: **SLOPING GROUND.** An inclined surface. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.161, November 2000).

S-401 Geo Feature: Sloping Ground (SLOGRD) (O)

Primitives: Point, Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>
 <i>Cliff / Natural Rock Wall</i>	 <i>Cliff / Natural Rock Wall</i>	 <i>Dune</i>

S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of slope	(CATSLO)	1 : cutting 2 : embankment 3 : dune 4 : hill 5 : pingo 6 : cliff 7 : scree	EN	1,1
colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 6 : yellow 7 : grey 8 : brown 11 : orange 13 : pink	EN	0,*
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
nature of surface	(NATSUR)	1 : Mud 2 : Clay 3 : Silt 4 : sand 5 : stone 6 : gravel 7 : pebbles 8 : Cobbles 9 : rock 11 : lava 14 : Coral 17 : Shells 18 : Boulder	EN	0,*
<i>radar conspicuous</i>	(CONRAD)		BO	0,1
<i>visual prominence</i>	(CONVIS)	1 : visually conspicuous 2 : not visually conspicuous 3 : prominent	EN	0,1
scale minimum	(SCAMIN)	For cliffs / rock walls that serve as a landmark for navigation EUR: 45 000, US: 60 000, for other objects 22 000 or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Reported Date	(SORDAT)		TD	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1

<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

† Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

5.10.1 Sloping ground

If it is required to encode the characteristics of a prominent or visually conspicuous inclined land surface, it must be done using the feature **Sloping Ground**.

Remarks:

- For guidance on the encoding of cuttings and embankments, see clause 5.2.

5.10.1.1 Dunes, sand hills

If it is required to encode a sand dune or sand hill, it must be done using the feature **Sloping Ground** with attribute **category of slope** = 3 (dune) or 4 (hill) and attribute **nature of surface** = 4 (sand). If these features are positioned along the coastline, a **Coastline** feature must also be encoded.

If it is required to encode the height of a dune or sand hill, a **Land Elevation** feature (see clause 5.5) must also be encoded.

Distinction: Land Elevation; Slope Topline.

Inland specific remarks:

- **Sloping Ground** (SLOGRD) is used for natural dunes or ridges, roughly paralleling the waterway, to keep flood waters within the river course.

It is also used for Cliff / Natural Rock Wall (Land rising abruptly for a considerable distance above the water or surrounding land. (IHO Dictionary, S-32, 5th Edition, 829)) and for Cuttings (excavations through high ground for a road, canal, etc.) and Embankments (artificial elevations constructed from earth, stone, etc. carrying a road, railway or similar or serving to dam water).

Inland specific Encoding Instructions:

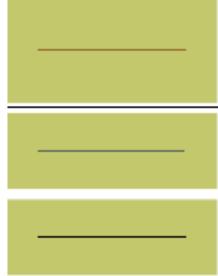
- When the **Sloping Ground** (SLOGRD) is of type surface, it must have a **Land Area** (LNDARE) underneath.
- At large scale, the crown (the topline of the dune) may be encoded as a **Slope Topline** (SLOTOP) with **category of slope** (CATSLO) = 2 (embankment).
- Cliffs / Rock Walls shall be encoded using the feature **Sloping Ground** (SLOGRD) and/or **Slope Topline** (SLOTOP). **Sloping Ground** (SLOGRD) may be used at large scale to indicate the horizontal extent of the cliff. See also 5.1.
Slope Topline (SLOTOP) should be used on its own to encode cliffs at small scale, or in conjunction with **Sloping Ground** (SLOGRD) to indicate the crest of the cliff when it is considered useful to know its elevation, and/or to encode a cliff on land distant from the coastline. When the cliff is coincident with the coastline, a **Coast Line** (COALNE) feature with the attribute **category of coastline** (CATCOA) = 1 (steep coast) should be encoded and there should be no **Sloping Ground** (SLOGRD) or **Slope Topline** (SLOTOP) encoded.
US: Use **Caution Area** (CTNARE) to buffer between waterline into depth area. **Caution Area** (CTNARE) should be a minimum of 12 m wide. Encode **Caution Area** (CTNARE) with **information text** (INFORM) = Natural Rock Wall.
EUR: If a rock wall is in navigable water and is a hazard to navigation, a **Caution Area** (CTNARE) shall be added.
- Embankments shall be encoded using the feature **Sloping Ground** (SLOGRD) and/or using the feature **Slope Topline** (SLOTOP), with the **category of slope** (CATSLO) = 2 (embankment). See also 5.2. Sloping Ground (SLOGRD) of type surface should be delineated at the toe of the embankment.
Slope Topline (SLOTP) should be used on its own to encode embankments at small scale and/or to encode an embankment on land distant from the shoreline.
- Cuttings shall be encoded using the feature **Sloping Ground** (SLOGRD) and/or **Slope Topline** (SLOTOP), with the attribute **category of slope** (CATSLO) = 1 (cutting).
- Sloping Ground** (SLOGRD) may be used at a large scale to indicate the horizontal extent of the cutting or embankment.

5.11 Slope topline

IHO Definition: **SLOPE TOPLINE.** The upper marking of a slope, for example the ridge line or the separation line between two different gradients. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.160, November 2000).

S-401 Geo Feature: Slope Topline (SLOTOP) (O)

Primitives: Curve

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
			Cutting	
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of slope	(CATSLO)	1 : cutting 2 : embankment 3 : dune 6 : cliff	EN	1,1
colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 6 : yellow 7 : grey 8 : brown 11 : orange 13 : pink	EN	0,*
elevation	(ELEVAT)		RE	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
interoperability identifier		MRN (see clause 27.161)	URN	0,1
nature of surface	(NATSUR)	1 : Mud 2 : Clay 3 : Silt 4 : sand 5 : stone 6 : gravel 7 : pebbles 8 : cobbles 9 : rock 11 : lava 14 : Coral 17 : Shells 18 : Boulder	EN	0,*

<i>radar conspicuous</i>	(CONRAD)		BO	0,1
visual prominence	(CONVIS)	1 : visually conspicuous 2 : not visually conspicuous 3 : prominent	EN	0,1
scale minimum	(SCAMIN)	For cliffs / rock walls that serve as a landmark for navigation EUR: 45 000, US: 60 000, for other objects 22 000 or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
<i>Vertical Uncertainty</i>	(VERACC)		C	0, 1
Uncertainty Fixed	(POSACC) (SOUACC) (VERACC)	[xx.xx] (metres), e.g., 1.54	(S) RE	1, 1
Uncertainty Variable Factor			(S) RE	0, 1
<i>Category of Temporal Variation</i>	(CATTEV)	4 : Likely to Change 5 : Unlikely to Change 6 : Unassessed	EN	0, 1
Condition	(CONDTN)	1 : Under Construction 2 : Ruined 3 : Under Reclamation 5 : Planned Construction	EN	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Reported Date	(SORDAT)		TD	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication	(S) EN	0, 1

		7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data		
.....Source	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

5.15.1 Slope topline

If it is required to encode the upper marking of a prominent or visually conspicuous land slope, it must be done using the feature **Slope Topline**.

Remarks:

- For guidance on the encoding of cliffs, see clause 5.1. For guidance on the encoding of cuttings and embankments, see clause 5.2.

Distinction: Coastline; Land Elevation; Sloping Ground.

Inland specific Encoding Instructions:

- A) The crown (the topline of a dune) may be encoded as a **Slope Topline** (SLOTOP) with **category of slope** (CATSLO) = 2 (embankment).
- B) Cliffs / Rock Walls shall be encoded using the feature **Sloping Ground** (SLOGRD) and/or **Slope Topline** (SLOTOP). See also 5.1.

- C) **Slope Topline** (SLOTOP) should be used on its own to encode cliffs at small scale, or in conjunction with **Sloping Ground** (SLOGRD) to indicate the crest of the cliff when it is considered useful to know its elevation, and/or to encode a cliff on land distant from the coastline.
- D) When the cliff is coincident with the coastline, a **Coastline** (COALNE) feature with the attribute **category of coastline** (CATCOA) = 1 (steep coast) should be encoded and there should be no **Sloping Ground** (SLOGRD) or **Slope Topline** (SLOTOP) encoded.
- E) Cuttings shall be encoded using the feature **Sloping Ground** (SLOGRD) and/or **Slope Topline** (SLOTOP), with the attribute **category of slope** (CATSLO) = 1 (cutting). See also 5.2.
- F) Embankments shall be encoded using the feature **Sloping Ground** (SLOGRD) and/or using the feature **Slope Topline** (SLOTOP), with the **category of slope** (CATSLO) = 2 (embankment). See also 5.2.
- G) **Slope Topline** (SLOTOP) should be used on its own to encode embankments at small scale and/or to encode an embankment on land distant from the shoreline.
- H) The crown of a dyke (the topline of the dyke) may be encoded as a **Slope Topline** (SLOTOP) with **category of slope** (CATSLO) = 2 (embankment) at large scale.

5.12 Tideway

IHO Definition: **TIDEWAY.** A channel through which a tidal current runs. (IHO Dictionary – S-32). A natural water course in intertidal areas where water flows during the ebb or flood can also be encoded as **Tideway** (TIDEWY) in IENCs.

S-401 Geo Feature: Tideway (TIDEWY) (O)

Primitives: Curve, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
interoperability identifier		MRN (see clause 27.161)	URN	0,1
scale minimum	(SCAMIN)	30 000 or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFOM)		(S) TE	0,1 †
Pictorial Representation	(PICREP)		TE	0, 1
Reported Date	(SORDAT)		TD	0, 1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural	(S) EN	0, 1

		9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0, *
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

† Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

5.12.1 Tideways

If it is required to encode a natural watercourse in intertidal areas, for example formed by the outflow of a stream or by tidal action, it must be done using the feature **Tideway**.

Remarks:

- No remarks.

Distinction: Canal; River; Sea Area/Named Water Area; Waterway Area.

Inland specific Encoding Instructions:

- A) This feature must be on top of features of Group 1 (**Depth Area** (DEPARE, depare), **Dredged Area** (DRGARE) or **Unsurveyed Area** (UNSARE)).

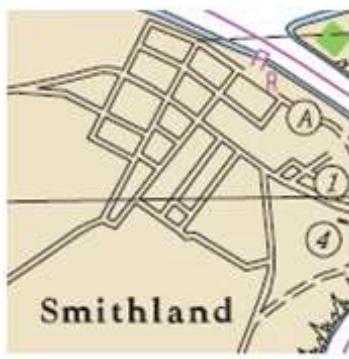
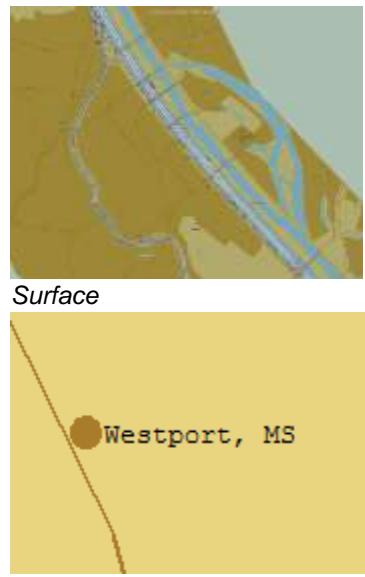
6 Geo Features – Cultural Features

6.1 Built-up area

IHO Definition: **BUILT-UP AREA.** An area of land or construction over the water containing a concentration of buildings and/or other structures. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

S-401 Geo Feature: Built-Up Area (BUAARE) (O)

Primitives: Point, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol
		 Surface  Point

S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of built-up area	(CATBUA)	1 : urban area 2 : settlement 3 : village 4 : town 5 : city 6 : holiday village	EN	0,1
condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
height	(HEIGHT)		RE	0,1
interoperability identifier		MRN (see clause 27.161)	URN	0,1
radar conspicuous	(CONRAD)		BO	0,1

reported date	(SORDAT)	See clause 2.4.8	TD	0,1
<i>visual prominence</i>	(CONVIS)	1 : visually conspicuous 2 : not visually conspicuous 3 : prominent	EN	0,1
scale minimum	(SCAMIN)	[EUR: 90000 (except: 700000 for CATBUA1 and 180000 for CATBUA5); US: 75000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFOM)		(S) TE	0,1 †
<i>pictorial representation</i>	(PICREP)	See clause 2.4.12.2	TE	0,1
in the water			BO	0,1
UN Location Code	(unlocd)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
<i>.....Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1

.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

6.1.1 Built-up areas

When representing built-up areas, the aim of the compiler must be to create the correct impression of the extent of the built-up area.

If it is required to encode a built-up area, it must be done using the feature **Built-Up Area**.

Remarks:

- A built-up area crossed by curve features (for example roads, streets, railways) should not be divided into multiple features, unless separate sections of the built-up area have at least one different attribute value.
- However, for presentation purposes, a built-up area of type surface crossed by a river or canal of type surface must be divided into several features, with the built-up area features not overlapping the river or canal feature. A built-up area of type surface should not overlap a lake, dock or lock basin feature of type surface.
- Several buildings or built-up areas may be referred to by the same settlement, village or town name on the source. In such cases, the individual buildings or built-up areas should be encoded as separate unnamed features, using the features **Building** or **Built-Up Area**, and additionally, an **Administration Area** feature (see clause 16.9) covering the whole named area should be created with the name encoded using the attribute **feature name**. The encoded **Administration Area** feature should also have the attribute **jurisdiction** = 3 (national sub-division).
- Built-Up Area** should be covered by **Land Area** features of type surface, or be coincident with **Land Area** features of type point.
- Where the source indicates that a built-up area extends into navigable water (over **Depth Area** or **Unsurveyed Area** feature(s)), the **Built-Up Area** should be extended over the water area and the Boolean attribute **in the water** must be set to *True* to indicate that the feature is to be included in the Inland ECDIS or ECS Base Display. The actual coastline should be encoded as **coastline**, having no value populated for **category of coastline**. There is no requirement to split the **Built-Up Area** into two separate features where it crosses the coastline; or to encode the “apparent” coastline (seaward edge of the built-up[area]). Underlying bathymetry (depth contours, soundings) may be

encoded as required. Exceptionally, encoders may extend the underlying **Land Area** and **Coastline** features seaward to the “apparent” coastline. This encoding should be considered for generalization purposes on smaller scale IENCs. Where the built-up area extends over navigable water it is not required to encode any supporting structures (for example piles, stilts).

- For encoding individual buildings over navigable water, see clause 6.2.1.

Distinction: Building; Landmark; Railway; Road.

Inland specific Encoding Instructions:

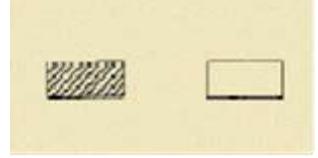
- A) EUR: Outline of **Built-up Areas** (BUAARE) using surface feature should be real built-up areas; only in case no detailed data is available (e.g., from flight surveys or satellite pictures) the political bounds can be used.
- B) US: Outline of **Built-up Areas** (BUAARE) should be the political bounds.
- C) **Category of built-up area** (CATBUA) may be encoded according to the following definitions based on inhabitants:
 - Urban area (more than 100.000)
 - City (20.000 – 100.000)
 - Town (5.000 – 20.000)
 - Village (100 - 5000)
 - Settlement (few houses/farms)
- D) **Built-up Areas** (BUAARE) should be represented as point feature for towns and small communities where the limits are not known. Points should be oriented on the highest buildings (e.g., church towers) or the town centres.
- E) Built-up areas that use the shoreline as a limit must share the same geometry.
- F) US: Use name and state abbreviation, e.g., Westport, MS for **feature name** (OBJNAM).
- G) EUR: If the ISRS Location Code is available, it has to be encoded (refer to 2.4.13) If a MRN or RIS-ID is available, the attribute **interoperability identifier** must be encoded (refer to **Fehler! V erweisquelle konnte nicht gefunden werden.**).
- H) Collect areas of buildings that are not individually navigationally significant as **Built-up Areas** (BUAARE) by collecting a surface around the outer edges of the outermost buildings or street patterns.
- I) It is recommended that minimal Railway (RAILWY) features be collected in a **Built-up Area** (BUAARE).
- J) In **Built-up Areas** (BUAARE), with exception to roads providing access to the waterfront, **Roadways** (ROADWY) should be restricted to a set of routes representative of the urban layout.

6.2 Building

IHO Definition: **BUILDING.** A free-standing self-supporting construction that is roofed, usually walled, and is intended for human occupancy (for example: a place of work or recreation) and/or habitation. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010). For IENCs: Buildings with a special function, which may be of interest for the boatmaster.

S-401 Geo Feature: Building (BUISGL) (O)

Primitives: Point, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
				
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
<i>building shape</i>	(BUISHP)	5 : high-rise building 6 : pyramid 7 : cylindrical 8 : spherical 9 : cubic	EN	0,1
<i>colour</i>	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,* (ordered)
<i>colour pattern</i>	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1 [†]
<i>condition</i>	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation	EN	0,1

		4 : wingless 5 : planned construction		
<i>elevation</i>	(ELEVAT)		RE	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
function	(FUNCTN)	2 : harbour-masters office 3 : customs office 4 : health office 5 : hospital 6 : post office 7 : hotel 8 : railway station 9 : police station 10 : water-police station 11 : pilot office 12 : pilot lookout 13 : bank office 14 : headquarters for district control 15 : transit shed/warehouse 16 : factory 17 : power station 18 : administrative 19 : educational facility 20 : church 21 : chapel 22 : temple 23 : pagoda 24 : Shinto shrine 25 : Buddhist temple 26 : mosque 27 : marabout 28 : lookout 29 : communication 30 : television 31 : radio 32 : radar 33 : light support 34 : microwave 35 : cooling 36 : observation 37 : timeball 38 : clock 39 : control 40 : airship mooring 41 : stadium 42 : bus station 44 : sea rescue control 45 : observatory 46 : ore crusher 47 : boathouse 48 : pumping station	EN	0,*
<i>height</i>	(HEIGHT)		RE	0,1
interoperability identifier		MRN (see clause 27.161)	URN	0,1

<i>multiplicity of features</i>			C	0,1
multiplicity known			(S) BO	1,1
number of features			(S) IN	0,1
<i>nature of construction</i>	(NATCON)	1 : masonry 2 : concreted 6 : wooden 7 : metal 8 : glass reinforced plastic 12 : glass	EN	0,*
<i>radar conspicuous</i>	(CONRAD)		BO	0,1
reported date	(SORDAT)	See clause 2.4.8	TD	0,1
<i>status</i>	(STATUS)	4 : not in use 7 : temporary 8 : private 12 : illuminated 13 : historic 14 : public	EN	0,*
<i>vertical length</i>	(VERLEN)		RE	0,1
visual prominence	(CONVIS)	1 : visually conspicuous 2 : not visually conspicuous 3 : prominent	EN	0,1
scale minimum	(SCAMIN)	[US: 18750; EUR: 22000 (except: 45000 for FUNCT20-CONVIS2, 45000 for FUNCT33- CONVIS2, 90000 for FUNCTN20-CONVIS1, 90000 for FUNCTN33- CONVIS1)] or see clause 2.5.9	IN	1,1
<i>information</i>	(INFORM)	See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
<i>pictorial representation</i>	(PICREP)	See clause 2.4.12.2	TE	0,1
in the water			BO	0,1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company	(S) EN	0, 1

		11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Structure	Structure/Equipment (see clause 25.12)	Daymark, Distance Mark, Fog Signal, Heliport, Light Air Obstruction, Light All Around, Light Sectored, Notice Mark, Physical AIS Aid to Navigation, Radar Transponder Beacon, Sensor, Signal Station Traffic, Signal Station Warning	Composition	0,1
The Component	Aids to Navigation Association (see clause 25.2)	Fairway System, Traffic Separation Scheme, Two Way Route	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
	Additional Information (see clause 25.1)	Contact Details, NonStandard Working Day, Service Hours, Nautical Information	Association	0,*

-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*
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[†] The sub-attribute **colour pattern** is mandatory for buildings that have more than one value populated for the sub-attribute **colour**.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

6.2.1 Buildings

Waterfront, landmark and some public buildings should be encoded precisely and individually on the larger optimum display scale IENC data. When representing buildings generally, forming urban and suburban areas, villages, and other built-up areas, the aim of the compiler must be to create the correct impression of the extent of the built-up area and the density of the buildings.

Within built-up areas, only waterfront, landmark, and certain public buildings of interest should be encoded individually.

Scattered buildings of no individual importance must be omitted when more than about 2 kilometres inland. Nearer the shore they may be generalised by encoding a few representative buildings, sufficient to give the correct impression of building density.

Public buildings, with the possible exception of Post Offices and Hospitals, are charted mainly as visual features or points of reference ashore, not for their interest for particular functions. Except where they could be useful landmarks for navigation, they should be encoded only on largest optimum display scale IENC data.

Buildings constructed as places of worship often form significant landmarks; their size and structure incorporating towers, spires, cupolas, etc often render them conspicuous. These buildings when known to be prominent or conspicuous should be encoded up to several miles inland, with sufficient information to enable them to be easily identified. When the optimum display scale for the IENC data permits, the building should be encoded as a surface feature with attention being drawn to any significant features (landmarks).

If it is required to encode a building (other than a landmark, tank, silo or roofed structure erected or extending over navigable water), it must be done using the feature **Building**.

Remarks:

- For landmarks, see clause 7.2; for silos, tanks and water towers, see clause 7.3. For common encoding combinations, see clause 7.1. For roofed structures such as boathouses erected or extending over navigable water to provide protection for a vessel or its cargo, see clause 8.7.
-
- The feature association **Structure/Equipment** (see clause 25.12) must only be used with **Building** features if the main purpose of the building is to act as an aid to navigation (for example a lighthouse).
- A ruined building should be encoded in the same way as the feature in good condition, but with attribute **condition** = 2 (ruined).
- For an encoded **Building** feature located in navigable water, the Boolean attribute **in the water** must be set to *True* to indicate that the feature is to be included in the Inland ECDIS or ECS Base Display. Where such structures are located in the water it is not required to encode any supporting structures (for example piles, stilts).

- If it is required to encode vertical and/or horizontal clearances and any other information relevant for allowing vessels to enter or berth beneath/within the structure, this must be done by encoding the structure using the feature **Structure Over Navigable Water** (see clause 8.7).
- When a building is shown as a surface, indicating its true shape, and it is required to encode a prominent feature such as a tower or spire that is part of the structure, two features must be created (see Figure 6-1 below):
 - a **Building** feature of type surface for the main building,
 - a **Landmark** feature of type point for the prominent feature.

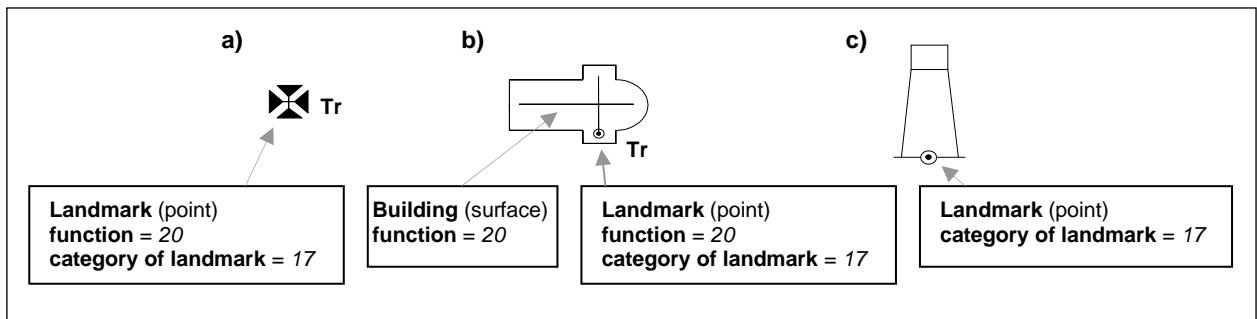


Figure 6-1 – Landmarks

- If available and considered important for route planning and/or monitoring, the vertical uncertainty associated with encoded vertical clearance values should also be encoded.

6.2.2 Harbour offices

If it is required to encode a harbour office, it must be done using a **Building** feature, with the attribute **function** taking at least one of the values:

- 2 - harbour-masters office
- 3 - customs office
- 4 - health office
- 11 - pilot office

6.2.3 Transit sheds and warehouses

If it is required to encode a transit shed or warehouse, it must be done using a **Building** feature, with attributes **function** = 15 (transit shed/warehouse), and if it is required, **feature name (name)** = name or number of the shed.

Distinction: Built-Up Area; Coast Guard Station; Landmark; Rescue Station; Silo/Tank, Structure Over Navigable Water.

Inland specific distinctions:

- A) Fortified structures shall be encoded as **Fortified Structures** (FORSTC), E.3.3, if they can be seen from the water.
- B) Buildings that are visible from the water and that may be used as landmarks shall be collected as **Landmark** (LNDMRK) if possible.
- C) Buildings that can be encoded as **Harbour Facility** (HRBFAC, hrbfac) should not be encoded as **Building** (BUISGL).

Inland specific Encoding Instructions:

- A) Only buildings with a special function, which may be of interest for the skipper, should be encoded as **Building** (BUISGL).
- B) Collect areas of buildings that are not individually navigationally significant as **Built-up Areas** (BUAARE) by collecting a surface around the outer edges of the outermost buildings or street patterns.
- C) Buildings or structures with specialized functions must be attributed with the appropriate enumeration of the attribute **function** (FUNCTN).
- D) Buildings that extend into water should be encoded as Dock/Wharf (**Shoreline Construction** (SLCONS, slcons)) with appropriate enumeration of the attribute **category of shoreline construction** (CATSLC). Then the building should be placed on that dock.

6.3 Airport/airfield

IHO Definition: **AIRPORT/AIRFIELD.** A defined area on land (including any buildings, installations and equipment) intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

S-401 Geo Feature: Airport/Airfield (AIRARE) ©

Primitives: Point, Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of airport/airfield	(CATAIR)	: military aeroplane airport 2 : civil aeroplane airport : military heliport : civil heliport : glider airfield : small planes airfield : emergency airfield 9 : search and rescue airfield	EN	0,*
condition	(CONDTN)	: under construction 2 : ruined : under reclamation 5 : planned construction	EN	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)	[(Name) + "Airport" or (Name) + "Airfield"]	(S) TE	1,1
name usage		: default name display 2 : alternate name display	(S) EN	0,1 †
interoperability identifier		MRN (see clause 27.161)	URN	0,1
reported date	(SORDAT)	See clause 2.4.8	TD	0,1
status	(STATUS)	: permanent 2 : occasional : not in use : periodic/intermittent : reserved : temporary : private 12 : illuminated 14 : public	EN	0,*
scale minimum	(SCAMIN)	[45000] or see clause 2.5.9	IN	1,1

<i>information</i>	(INFORM)	See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 [†]
<i>pictorial representation</i>	(PICREP)	See clause 2.4.12.2	TE	0,1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control : Police : Port : Immigration : Health : Coast Guard : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		: Law or Regulation 2 : Official Publication : Mariner Report, Confirmed : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		: default name display 2 : alternate name display	(S) EN	0,1 [†]
Feature Associations				

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
	Additional Information (see clause 25.1)	Contact Details, NonStandard Working Day, Service Hours, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

6.3.1 Airfields

Airfields (or airports) within a few miles of the coast must be charted on larger and medium optimum display scale IENC data; they are significant to coastal navigation because of the many visual and audible features associated with them and the related air traffic.

For IENC data at larger optimum display scales, an airport should be encoded using a combination of the following features: **Airport/Airfield** (surface), **Runway** (surface or curve), **Building** (surface or point) and **Landmark** (surface or point). At least one **Airport/Airfield** or **Runway** must be in this set of features.

For IENC data at smaller optimum display scales, an airport should be encoded as an **Airport/Airfield** of type point.

Remarks:

- If individual buildings are visually conspicuous, they must be encoded as separate features.
- If it is required to encode the control tower, it must be done using a **Landmark** feature, with attributes **function** = 39 (control) and **category of landmark** = 17 (tower). If it is required to encode other buildings, this must be done using the feature **Building**.
- If it is required to encode a seaplane landing area, it must be done using the feature **Seaplane Landing Area** (see clause 16.6).
- For navigational aids associated with air navigation, and air obstruction lights, see clauses related to navigational aids.

Distinction: Helipad, Runway; Seaplane Landing Area.

Inland specific Encoding Instructions:

- A) Code outline of runways. Include taxiways and tarmacs, if the information is available.
- B) Coding as a point is subject to data availability or subject to the scale of the chart.
- C) Runways where lights can be seen from passing vessels shall be encoded.

6.4 Runway

IHO Definition: **RUNWAY**. A defined area, on a land aerodrome, prepared for the landing and take-off run of aircraft. (Adapted from IHO Dictionary – S-32).

S-401 Geo Feature: Runway (RUNWAY) (O)

Primitives: Point, Curve, Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
				
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
<i>condition</i>	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
<i>feature name</i>		See clause 2.5.8	C	0,*
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 †
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>nature of construction</i>	(NATCON)	1 : masonry 2 : concreted 4 : hard surfaced 5 : unsurfaced 6 : wooden 7 : metal	EN	0,*
<i>periodic date range</i>		See clause 2.4.8	C	0,*
<i>date end</i>	(PEREND)		(S) TD	1,1
<i>date start</i>	(PERSTA)		(S) TD	1,1
<i>reported date</i>	(SORDAT)	See clause 2.4.8	TD	0,1
<i>status</i>	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 12 : illuminated 14 : public	EN	0,*

scale minimum	(SCAMIN)	[45000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
Visual Prominence	(CONVIS)	1 : Visually Conspicuous 2 : Not Visually Conspicuous	EN	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1

name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
	Additional Information (see clause 25.1)	Contact Details, NonStandard Working Day, Service Hours, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

6.4.1 Airfields

Airfields (or airports) within a few miles of the coast must be encoded on large and medium optimum display scale IENC data; they are significant to coastal navigation because of the many visual and audible features associated with them and the related air traffic.

For larger optimum display scale IENC data, an airport should be encoded using a combination of the following features: **Airport/Airfield** (surface), **Runway** (surface or curve), **Building** (surface or point) and **Landmark** (surface or point). At least one **Airport/Airfield** or **Runway** must be in this set of features.

Remarks:

- Two or more crossing runways may be encoded as one surface.
- If it is required to encode a seaplane landing area, it must be done using the feature **Seaplane Landing Area** (see clause 16.6).
- For navigational aids associated with air navigation, and air obstruction lights, see clauses related to navigational aids.

Distinction: Airport/Airfield; Helipad; Seaplane Landing Area.

Inland specific Encoding Instructions:

- A) Coding as point or curve is subject to data availability or subject to the scale of the chart.
- B) Runways where lights can be seen from passing vessels should be encoded.

6.5 Helipad

IHO Definition: HELIPAD. A site on which helicopters may land and take off. (IHO Dictionary – S-32).				
S-401 Geo Feature: Helipad (RUNWAY) (O)				
Primitives: Point				
Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
condition	(CONDTN)	: under construction 2 : ruined : under reclamation 5 : planned construction	EN	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		: default name display 2 : alternate name display	(S) EN	0,1 [†]
interoperability identifier		MRN (see clause 27.161)	URN	0,1
nature of construction	(NATCON)	: masonry 2 : concreted : hard surfaced : unsurfaced : wooden 7 : metal	EN	0,*
periodic date range		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
reported date	(SORDAT)	See clause 2.4.8	TD	0,1
status	(STATUS)	: permanent 2 : occasional : not in use : periodic/intermittent : reserved : temporary : private 12 : illuminated 14 : public	EN	0,*
scale minimum	(SCAMIN)	[45000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]

headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM)		(S) TE	0,1 †
	(NINFORM)			
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control : Police : Port : Immigration : Health : Coast Guard : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		: Law or Regulation 2 : Official Publication : Mariner Report, Confirmed : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0, *
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		: default name display 2 : alternate name display	(S) EN	0,1 †
Pictorial Representation	(PICREP)		TE	0, 1
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Equipment	Structure/Equipment (see clause 25.12)	Building, Landmark, Offshore Platform	Association	0,*

The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0, *
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
	Additional Information (see clause 25.1)	Contact Details, NonStandard Working Day, Service Hours, Nautical Information	Association	0, *
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0, *

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

Helipads

If it is required to encode a helipad, it must be done using the feature **Helipad**.

Remarks:

- Heliports must be encoded, where required, using the feature **Airport/Airfield** (see clause 6.3). Where a heliport has been encoded, there is no requirement to indicate the individual helipads using **Helipad**.
- If it is required to encode an area where helicopters may stop down on water, it must be done using the feature **Seaplane Landing Area** (see clause 16.6).
- Where a **Helipad** feature has been encoded as part of an offshore platform, it must be associated to the **Offshore Platform** feature (see clause 14.1) using the association **Structure/Equipment** (see clause 25.12).
- For navigational aids associated with air navigation, and air obstruction lights, see clauses related to navigational aids.

Distinction: Airport/Airfield; Runway; Seaplane Landing Area.

Inland specific Encoding Instructions:

- Coding as point or curve is subject to data availability or subject to the scale of the chart.
- Helipads where lights can be seen from passing vessels should be encoded.

6.6 Bridge

IHO Definition: **BRIDGE.** A structure erected over a depression or an obstacle such as a body of water, railroad, etc., to provide a roadway for vehicles or pedestrians. (IHO Dictionary – S-32).

S-401 Geo Feature: Bridge (bridge) (M)

Primitives: Curve, Surface, No Geometry

Real World

Bascule Bridge



Bridge with Bridge Arches



Fixed Bridge



Lift Bridge



Suspension Bridge

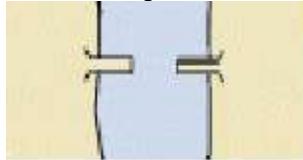


Swing Bridge

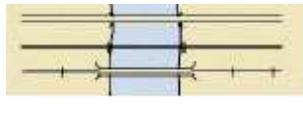


Paper Chart Symbol

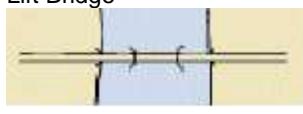
Bascule Bridge



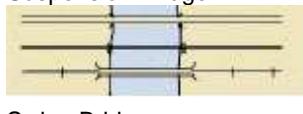
Fixed Bridge



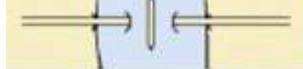
Lift Bridge



Suspension Bridge



Swing Bridge

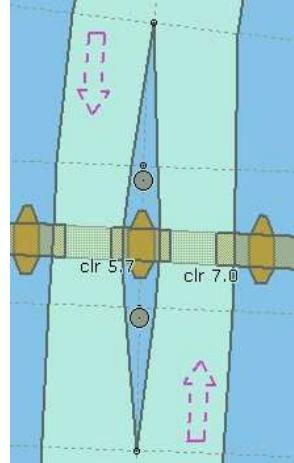


Inland ECDIS or ECS Symbol

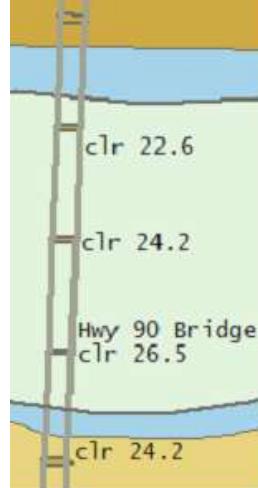
Bascule Bridge

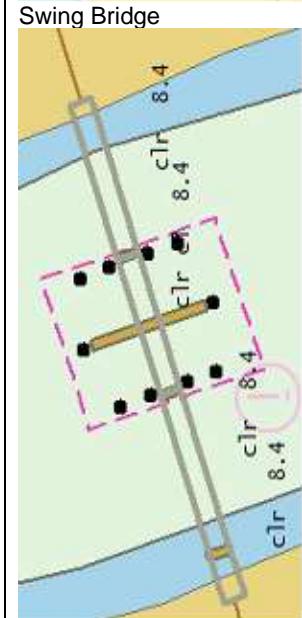


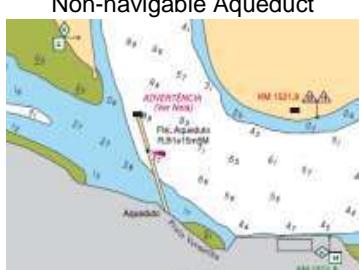
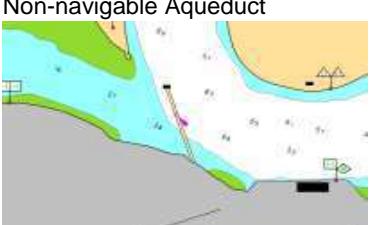
Bridge with Bridge Arches



Fixed Bridge





Non-navigable Aqueduct				
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
bridge construction	(CATBRG)	1 : arch 2 : viaduct 3 : pontoon bridge 4 : suspension bridge 5 : transporter bridge	EN	0,1
bridge function	(CATBRG)	1 : vehicular 2 : rail 3 : pedestrian 4 : aqueduct	EN	0,*
category of opening bridge	(CATBRG)	3 : swing bridge 4 : lifting bridge 5 : bascule bridge 7 : drawbridge	EN	0,1
colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,* (ordered)
colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1 †
condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1

feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
<i>fixed date range</i>		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
<i>height</i>	(HEIGHT)		RE	0,1
interoperability identifier		MRN (see clause 27.161)	URN	0,1
<i>nature of construction</i>	(NATCON)	1 : masonry 2 : concreted 6 : wooden 7 : metal 11 : latticed	EN	0,*
opening bridge	(CATBRG)		BO	0,1 †
<i>radar conspicuous</i>	(CONRAD)		BO	0,1
reported date	(SORDAT)	See clause 2.4.8	TD	0,1
<i>status</i>	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 12 : illuminated	EN	0,*
<i>visual prominence</i>	(CONVIS)	1 : visually conspicuous 2 : not visually conspicuous 3 : prominent	EN	0,1
scale minimum	(SCAMIN)	[EUR: 90000; US: 300000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
pictorial representation	(PICREP)	See clause 2.4.12.2	TE	0,1
UN Location Code	(unlocd)		TE	0, 1
Vertical Uncertainty	(VERACC)	[xx.xx] (metres), e.g., 1.54	C	0, 1
Uncertainty Fixed	(POSACC) (SOUACC) (VERACC)		(S) RE	1, 1
Uncertainty Variable Factor			(S) RE	0, 1

Category of Temporal Variation	(CATTEV)	4 : Likely to Change 5 : Unlikely to Change 6 : Unassessed	EN	0, 1
Reported Date	(SORDAT)		TD	0, 1
Waterway Distance	(wtwdis)	[xxxx.xxx] (units defined in distance unit of measurement), e.g., 2451.732	RE	0, 1
distance unit of measurement	(hunits)	1 : metres 2 : yards 3 : kilometres 4 : statute miles 5: nautical miles 7 : hectometres	EN	0,1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 †
Feature Associations				

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Collection	Bridge Aggregation (see clause 25.3)	Cable Overhead, Communication Area, Lateral Buoy, Notice Mark, Pipeline Overhead, Pontoon, Pylon/Bridge Support, Radio Calling-In Point, Shoreline Construction, Signal Staion Traffic, Signal Station Warning, Span Fixed, Span Opening, Two-Way Route Part, Waterway Gauge	Aggregation	0,1
The Structure	Structure/Equipment (see clause 25.12)	Daymark, Distance Mark, Fog Signal, Light Air Obstruction, Light All Around, Light Sectored, Notice Mark, Physical AIS Aid to Navigation, Radar Transponder Beacon, Sensor, Signal Station Traffic, Signal Station Warning	Composition	0,1
The Component	Lock Aggregation (see clause 25.23)	Lock Basin	Association	0,*
The Component	Aids to Navigation Association (see clause 25.2)	Fairway System, Traffic Separation Scheme, TwoWay Route	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
	Additional Information (see clause 25.1)	Contact Details, NonStandard Working Day, Service Hours, Nautical Information	Association	0,1
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] For bridges encoded over navigable water, the attribute **opening bridge** is mandatory.

The sub-attribute **colour pattern** is mandatory for bridges that have more than one value populated for the sub-attribute **colour**.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

6.6.1 Bridges

If it is required to encode a bridge, it should be done using the feature **Bridge**. Bridges may be encoded over water that is navigable or non-navigable at the optimum display scale of the IENC data. Where the bridge is encoded over navigable water, associated features such as spans, pylons and pontoons

of the bridge must be associated with the **Bridge** feature using the association **Bridge Aggregation** (see clause 25.3) (that is, the **Bridge** feature has geometry of type curve or surface, or has no geometry). Where the bridge is encoded over non-navigable water, then it must be encoded, where required, using a **Bridge** feature having no component features (that is, the **Bridge** feature has geometry of type curve or surface); or as a **Landmark** feature (see clause 7.2) if the bridge has geometry of type point.

The value of the vertical clearance between (high) water level and any fixed overhead obstruction must always be given, where known, on the largest optimum display scale IENC data intended for navigation under the bridge, and for detailed passage planning. The datum above which clearances are given must be a high water level, preferably Highest Astronomical Tide (HAT), where the tide is appreciable. For bridges over navigable water, the value for the vertical clearance(s) must be encoded using the features **Span Fixed** or **Span Opening** (see clauses 6.7 and 6.8), with the clearance(s) populated using the complex attributes **vertical clearance fixed**, **vertical clearance closed** and/or **vertical clearance open**, and sub-attributes populated relevant to the span.

Remarks:

- If it is required to encode the name of a bridge over navigable water, the **Bridge** should be encoded using geometry of type curve or surface, associated with all relevant components of the bridge using the association **Bridge Aggregation**. The extent of the geometry of the **Bridge** should utilise the geometry of all the components of the bridge so as to cover its full extent.
- If it is required to encode the extent of an unnamed bridge over navigable water, this may be done using a **Bridge** feature having no geometry, associated with all relevant components of the bridge using the association **Bridge Aggregation**.
- Water under a bridge must be encoded using the features **Depth Area**, **Dredged Area** or **Unsurveyed Area** (and appropriate **Depth Contour** and **Sounding** features) if the waterway is navigable at the optimum display scale for the IENC data, or using the feature **Land Area** if the waterway is not navigable at the optimum display scale for the IENC data.
- When there is a fixed vertical clearance, closed vertical clearance, or open vertical clearance given for a bridge, it should be applied only to the portion of the bridge to which the clearance refers, using the features **Span Fixed** or **Span Opening** (see clauses 6.7 and 6.8). All encoded bridge spans must be associated with the **Bridge** feature using the association **Bridge Aggregation** (see clause 25.3). See examples in the Figures below. If there are no vertical clearances given for a bridge and it is over water that is navigable at the optimum display scale of the IENC data, a single **Span Fixed** or **Span Opening** feature must be encoded covering the area of the bridge, having mandatory vertical clearance attributes populated with an empty (null) value.
- The attribute **height** is used, where required, to encode the height of the highest point on the bridge structure (see clause 2.5.7).
- If it is required to encode a bridge for which part or the entire span is moved aside or backwards, it must be done using a **Bridge** feature, with attributes **opening bridge** = *True* and **category of opening bridge** = 7 (drawbridge).
- If it is required to encode a pontoon bridge where a pontoon section may be temporarily removed or rotated so as to allow passage of vessels, this must be done using a **Bridge** feature, with attributes **bridge construction** = 3 (pontoon bridge), **opening bridge** = *True* and **category of opening bridge** = 3 (swing bridge) or 7 (draw bridge).
- If it is required to encode a distance mark that is included on or associated with a bridge, this must be done using the feature **Distance Mark** (see clause 8.10).
- In navigable water, bridge supports must be encoded, where possible, using a **Pylon/Bridge Support** feature (see clause 6.12), with attribute **category of pylon** = 4 (bridge/pylon tower) or 5 (bridge pier) or if the bridge is a pontoon bridge as **Pontoon** features (see clause 8.19).
- It is not mandatory to encode roads or railways on bridges.

6.6.2 Examples of Encoding Common Bridge Types

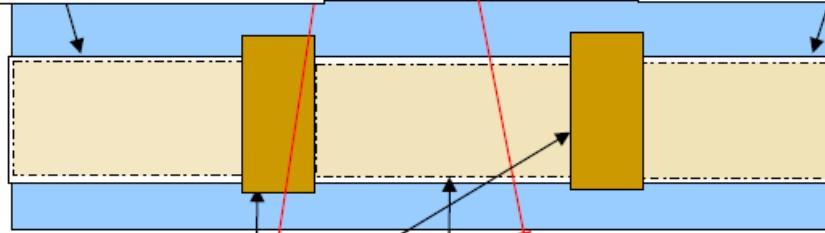
BASCULE BRIDGE

Bridge feature (surface): Geometry of all components
category of opening bridge = 5 (bascule bridge)
feature name = Tower Bridge
opening bridge = True

**The Component(s)
 (associated by Bridge Aggregation)**

Span Fixed
 vertical clearance fixed
 vertical clearance value = 6
 vertical uncertainty = 0.5
 vertical datum = 30 (HAT)

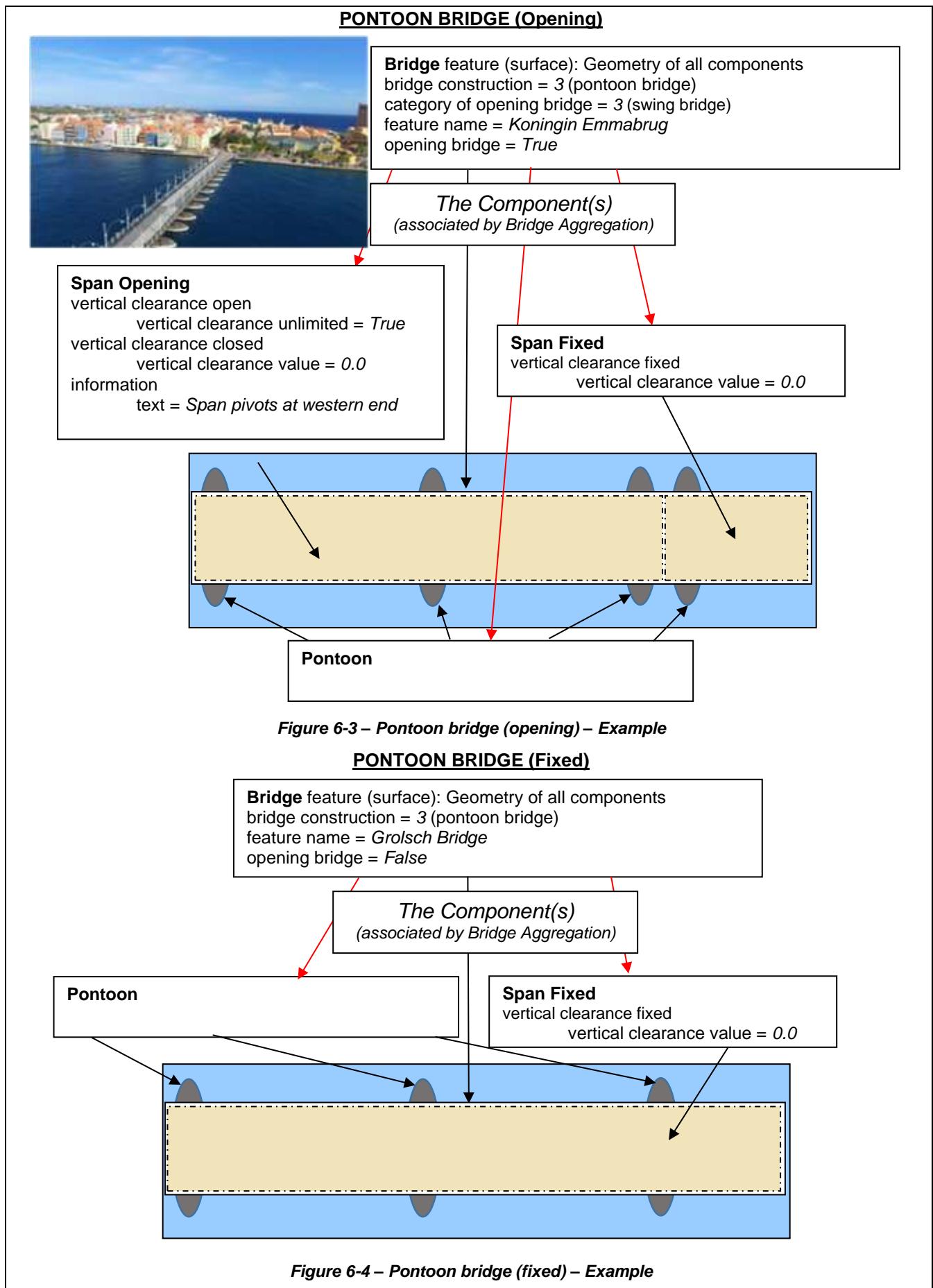
Span Fixed
 vertical clearance fixed
 vertical clearance value = 6
 vertical uncertainty = 0.5
 vertical datum = 30 (HAT)

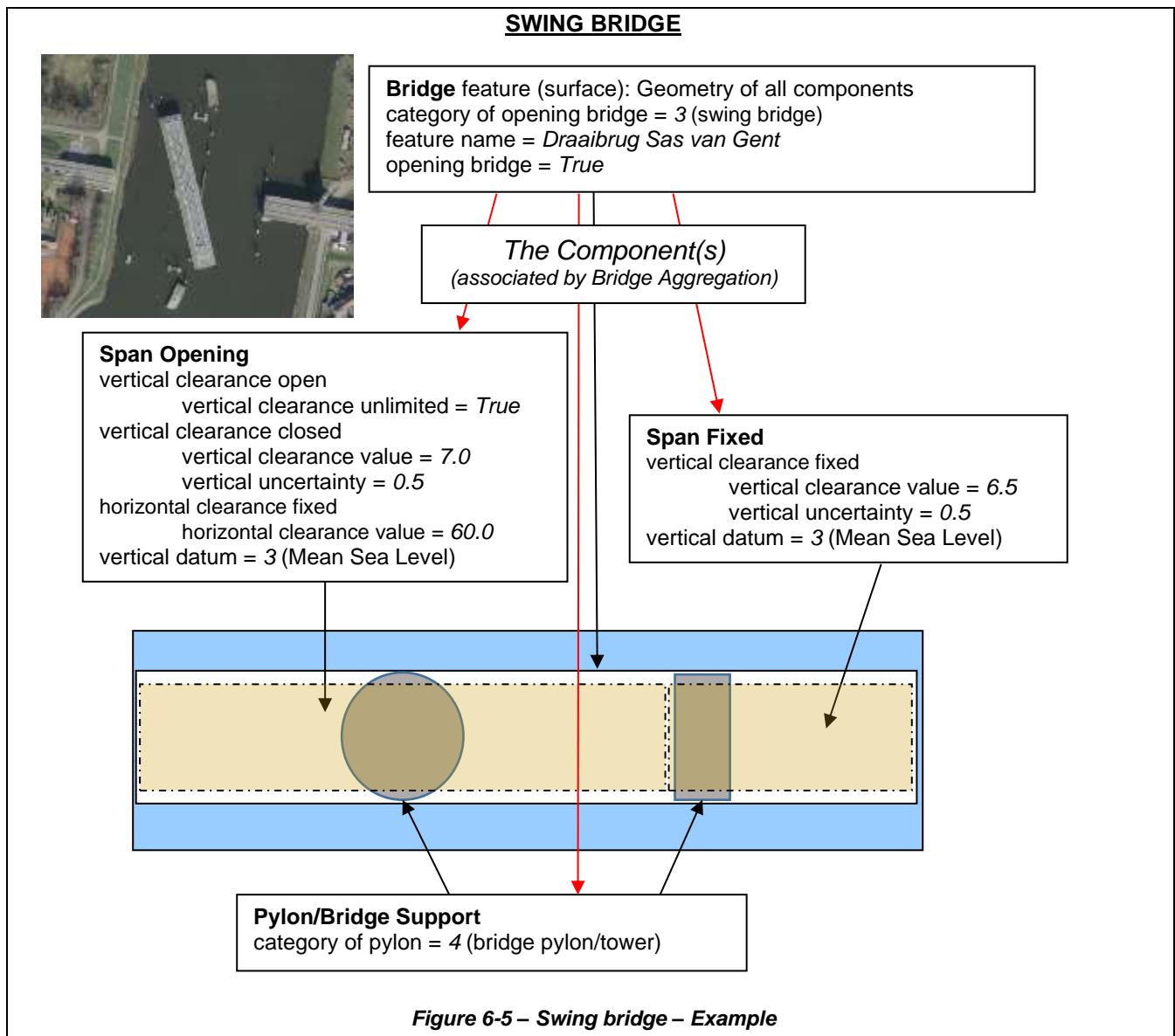


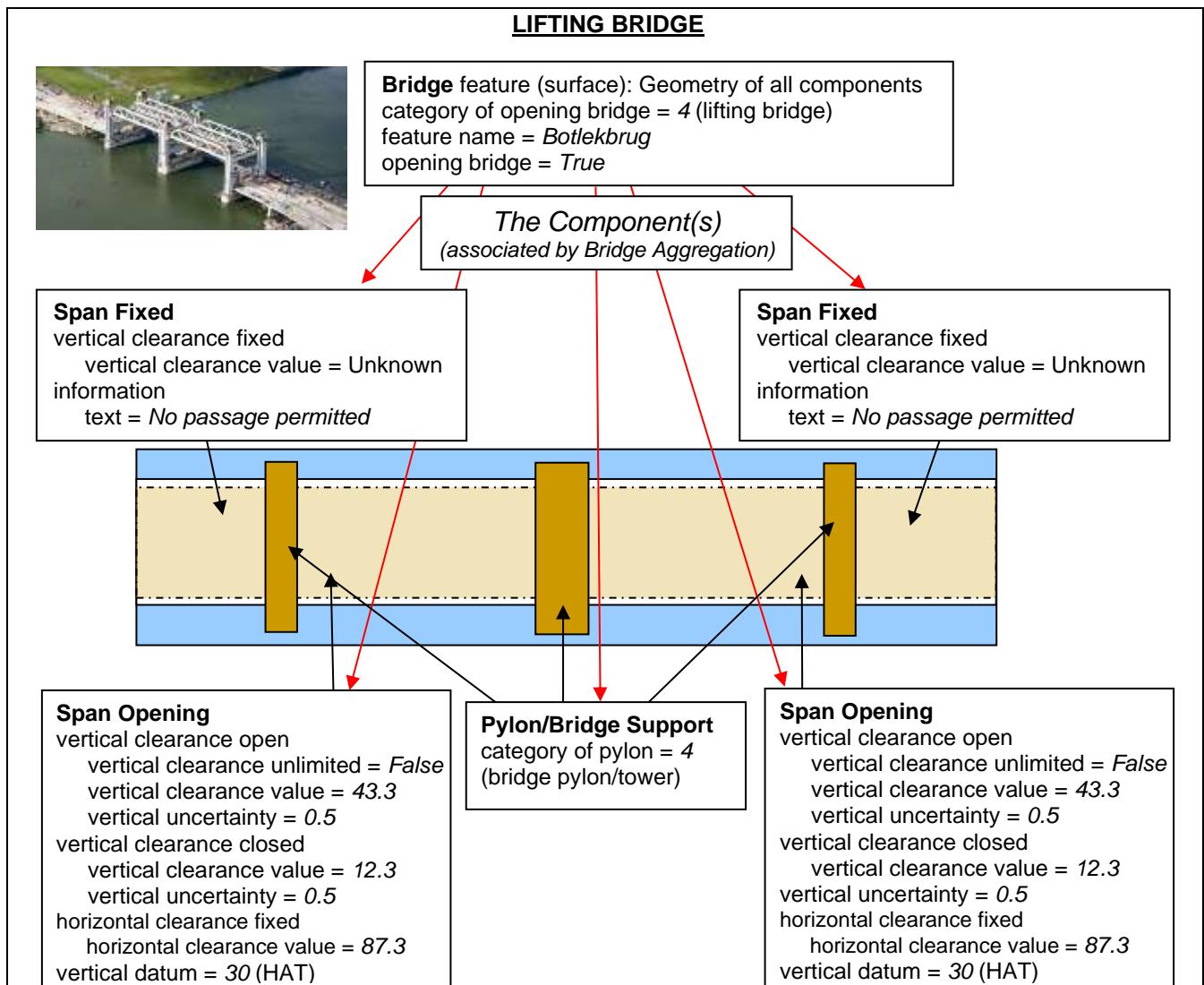
Pylon/Bridge Support
 category of pylon = 4 (bridge pylon/tower)

Span Opening
 vertical clearance open
 vertical clearance unlimited = False
 vertical clearance value = 42
 vertical uncertainty = 0.5
 vertical clearance closed
 vertical clearance value = 8
 vertical uncertainty = 0.5
 vertical datum = 30 (HAT)

Figure 6-2 – Bascule bridge - Example





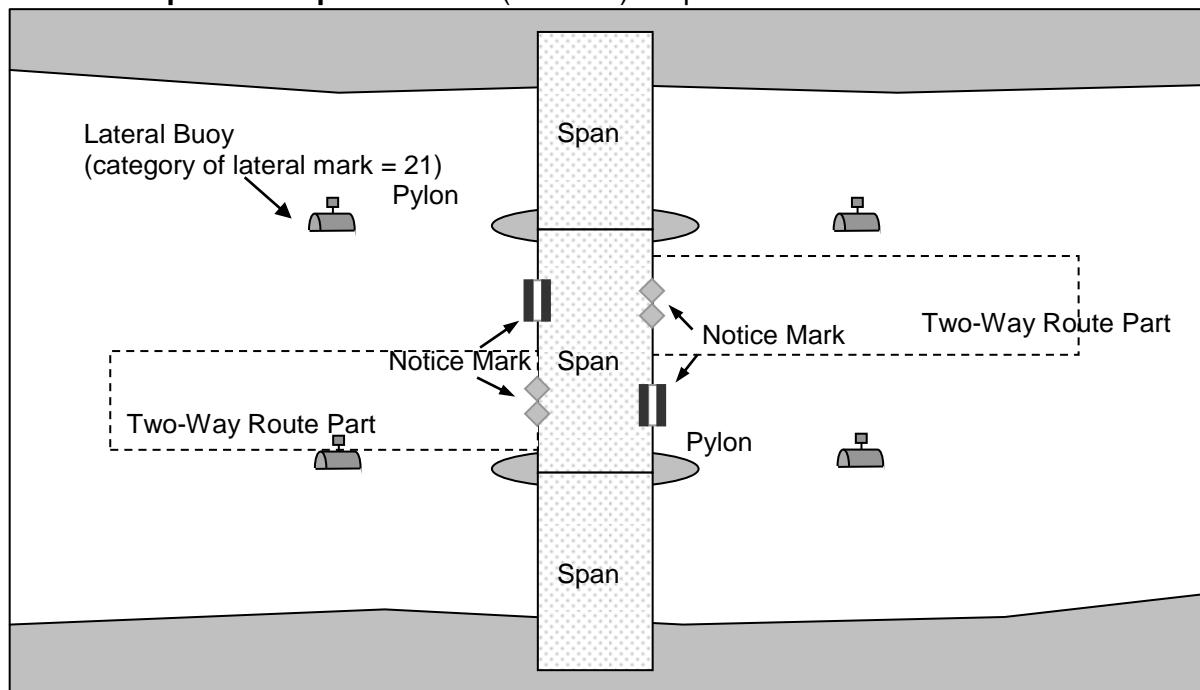
**Figure 6-6 – Lifting bridge – Example**

Distinction: Pipeline Overhead; Pontoon, Pylon/Bridge Support; Span Fixed; Span Opening.

Inland specific Encoding Instructions:

- A) All bridge types:
 - i) Bridge approaches (over the bankline) should be encoded.
 - ii) Roads and railways on bridges shall not be encoded.
 - iii) Place **Light All Around, Sectored Lights or Light Air Obstruction (LIGHTS)** at appropriate position on bridge features and piers bounding navigable channel.
 - iv) The ISRS Location Code of a bridge is assigned to each single span feature of the entire bridge (refer to 2.4.13). If a MRN or RIS-ID is available, the attribute **interoperability identifier** must be encoded (refer to **Fehler! Verweisquelle konnte nicht gefunden werden.**).
 - v) **category of bridge (CATBRG)** has to be encoded for the **Bridge** feature if all spans have the same category. If they have different categories the attribute has to be only encoded for the individual spans.
 - vi) For notice marks on bridges see clause 20.17.
 - vii) Use **pictorial representation (PICREP)**.

US: **pictorial representation (PICREP)** is mandatory
 EUR: **pictorial representation (PICREP)** is optional



- B) Bridges with opening spans:
 - i) The portions of the bridge that approach the span opening from either shore are to be encoded as span fixed (separate features). Only that portion of the bridge that is actually movable is to be encoded as a span opening.
- C) Swing Bridge
 - i) US & EUR: Add a **Caution Area (CTNARE)** feature (**information text (INFORM)** = Swing Area) around the swing area that is showing the actual swing area of the swinging bridge span.

6.7 Span fixed

IHO Definition: **SPAN FIXED.** A fixed component of the deck of a bridge spanning successive bridge piers. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2013).

S-401 Geo Feature: Span Fixed (bridge) (M)

Primitives: Curve, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol	Type	Multiplicity
See 6.6 bridge	See 6.6 bridge	See 6.6 bridge		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value		
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
horizontal clearance fixed			C	0,1
horizontal clearance value	(HORCLR)	[xx.x] (metres), e.g., 34.2	(S) RE	1,1
horizontal distance uncertainty	(HORACC)	[xx.xx] (metres), e.g., 1.54	(S) RE	0,1
interoperability identifier		MRN (see clause 27.161)	URN	0,1
vertical clearance fixed			C	1,1
vertical clearance value	(VERCLR)		(S) RE	1,1
vertical uncertainty	(VERACC)		(S) C	0,1
uncertainty fixed		[xx.xx] (metres), e.g., 1.54	(S) RE	1,1
uncertainty variable factor			(S) RE	0,1
vertical datum	(VERDAT)	3 : mean sea level 10 : Approximate Lowest Astronomical Tide 12 : Mean Lower Low Water 13 : Low water 16 : mean high water 17 : mean high water springs 18 : high water 19 : approximate mean sea level 20 : high water springs 21 : mean higher high water 23: lowest astronomical tide 24 : local datum 25 : international great lakes datum 1985 26 : mean water level 28 : higher high water large tide 29 : nearly highest high water 30 : highest astronomical tide 31 : Local Low Water Reference Level	EN	0,1

		32 : Local High Water Reference Level 33 : Local Mean Water Reference Level 34 : Equivalent Height of Water (German GIW) 35 : Highest Shipping Height of Water (German HSW) 36 : Reference Low Water Level According to Danube Commission 37 : Highest Shipping Height of Water According to Danube Commission 38 : Dutch River Low Water Reference Level (OLR) 39 : Russian Project Water Level 40 : Russian Normal Backwater Level 41 : Ohio River Datum 43 : Dutch High Water Reference Level 44 : baltic sea chart datum 2000 45 : Dutch Estuary Low Water Reference Level (OLW)		
scale minimum	(SCAMIN)	[EUR: 90000; US: 300000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
pictorial representation	(PICREP)	See clause 2.4.12.2	TE	0,1
bridge construction	(CATBRG)	1 : arch 2 : viaduct 3 : pontoon bridge 4 : suspension bridge 5 : transporter bridge	EN	0,1
UN Location Code	(unlocd)		TE	0, 1
Category of Temporal Variation	(CATTEV)	4 : Likely to Change 5 : Unlikely to Change 6 : Unassessed	EN	0, 1
Vertical River Datum Reference Level Value	(vcrval)	[xx.xx] (metres), e.g., 1.15	RE	0, 1
Name of Vertical River Datum Reference Level	(vcrlev)		TE	0, 1
Elevation of Water Level	(elevwl)	[xx.xx] (metres), e.g., 12.46	RE	0, 1
Reference Gauge	(refgag)		TE	0, 1
Reference Gravitational Level	(reflev)	1 : Baltic Datum 2 : Adriatic Level	EN	0, 1

		3 : Amsterdam Ordnance Datum (NAP) 4 : Mean Sea Level 5 : Other Datum 6 : National Geodetic Vertical Datum - NGVD29 7 : North American Vertical Datum - NAVD88 8 : Mean Sea Level 1912 9 : Mean Sea Level 1929 10 : Tweede Algemene Waterpassing		
Reported Date	(SORDAT)		TD	0, 1
Waterway Distance	(wtwdis)	[xxxx.xxx] (units defined in distance unit of measurement), e.g., 2451.732	RE	0, 1
distance unit of measurement	(hunits)	1 : metres 2 : yards 3 : kilometres 4 : statute miles 5 : nautical miles 7 : hectometres	EN	0,1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0, *

language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Component	Bridge Aggregation (see clause 25.3)	Bridge	Association	0,*
The Collection	Bridge Arch Association (see clause 25.20)	Span Fixed	Aggregation	0,1
The Component	Bridge Arch Association (see clause 25.20)	Span Fixed	Association	0,*
The Component	Lock Aggregation (see clause 25.23)	Lock Basin	Association	0,*
The Structure	Structure/Equipment (see clause 25.12)	Daymark, Distance Mark, Fog Signal, Light Air Obstruction, Light All Around, Light Sectored, Notice Mark, Physical AIS Aid to Navigation, Radar Transponder Beacon, Sensor, Signal Station Traffic, Signal Station Warning	Composition	0,1
The Component	Aids to Navigation Association (see clause 25.2)	Fairway System, Traffic Separation Scheme, TwoWay Route	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
	Additional Information (see clause 25.1)	Contact Details, NonStandard Working Day, Service Hours, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

6.7.1 Span fixed

If it is required to encode the clearance characteristics (vertical or horizontal) for any fixed part of a bridge between piers or supports, it must be done using the feature **Span Fixed**, which must be associated with the feature **Bridge** (see clause 6.6) using the association **Bridge Aggregation** (see clause 25.3). See clause 6.6 for examples of **Span Fixed** features aggregated to **Bridge**.

The value of the vertical clearance between (high) water level and any fixed overhead obstruction must always be given, where known, on the largest optimum display scale IENC data intended for navigation under the overhead obstruction, and for detailed passage planning. The datum above which clearances are given must be a high water level, preferably Highest Astronomical Tide (HAT), where the tide is appreciable. Clearances must be populated using the complex attribute **vertical clearance fixed** and sub-attributes populated relevant to the feature.

Remarks:

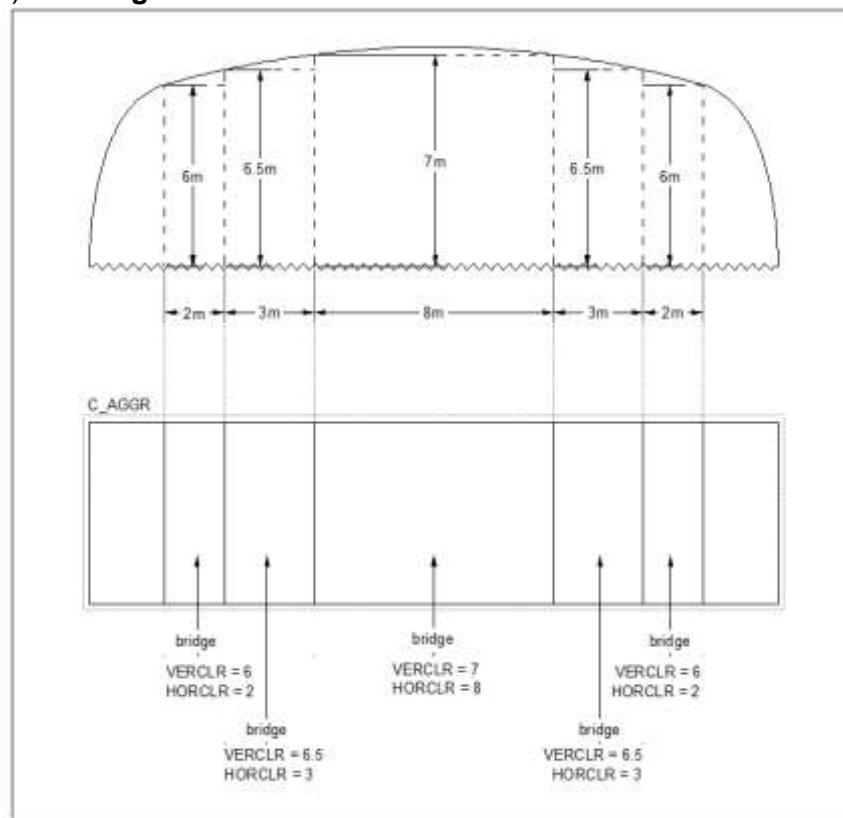
- **Span Fixed** features should only be encoded if the span is entirely or partly over navigable water at the optimum display scale for the IENC data.
- Where the optimum display scale of the IENC data is such that individual spans on a fixed bridge over navigable water cannot be indicated, the entire bridge should be covered by a single **Span Fixed** feature, having attributes populated according to the most navigationally important span.
- Value 13 (low water) for attribute **vertical datum** is only applicable to enclosed (inland) waterways; and must not be used to indicate the reference datum for vertical clearances in tidal waters.
- Where encoded, an associated instance of the cartographic feature **Text Placement** (see clause 23.1) relates to the positioning of the vertical and/or horizontal clearances for the span, where encoded. If available and considered important for route planning and/or monitoring, the vertical uncertainty associated with encoded vertical clearance values should also be encoded.

Distinction: Bridge; Cable Overhead; Conveyor; Pipeline Overhead; Span Opening.

Inland specific Encoding Instructions:

- A) All bridge types:
 - i) Bridge approaches (over the bankline) should be encoded.
 - ii) The ISRS Location Code of a bridge is assigned to each single span feature of the entire bridge (refer to 2.4.13). If a MRN or RIS-ID is available, the attribute **interoperability identifier** must be encoded (refer to **Fehler! Verweisquelle konnte nicht gefunden werden.**).
 - iii) Use **vertical datum** (VERDAT) only if vertical datum differs:
 - from DSPM VDAT subfield and
 - from Metadata feature **Vertical Datum of Data** (m_vdat) attribute.
 - iv) If there is no vertical clearance indicator at a bridge, but there is a gauge which can be used to calculate the vertical clearance of the bridge depending on the water level, it should be encoded in accordance with clause 22.15.
 - v) EUR: If there is a gauge which can be used to calculate the vertical clearance of the bridge, the ISRS Location Code of the gauge shall be encoded in the attribute **reference gauge** (refgag).
 - vi) Use **name of vertical river datum reference level** (vcrlev) and **vertical river datum reference level value** (vcrval) if the local value and name of vertical river datum reference level (design waterlevel) is known.
 - vii) **bridge construction** (CATBRG) has to be encoded for the **Bridge** feature if all spans have the same category. If they have different categories the attribute has to be only encoded for the individual spans.
 - viii) **Vertical clearance value** (VERCLR), **horizontal clearance value** (HORCLR), **waterway distance** (WTWDIS) and **distance unit of measurement** must be encoded for spans over navigable water. **Vertical clearance value** (VERCLR) should not be encoded for spans over non-navigable water.
 - ix) US: If separate spans are required, each span's **information** (INFORM) should indicate whether it is the "Primary Navigation Span", "Secondary Navigation Span", or "Not to be used for Navigation."
- B) Bridge with Bridge Arches

- i) The following instructions are only necessary if the available space according to the beam and air-draft of the vessel shall be indicated.
- This is only possible if the arch of the span can be separated into different single pieces with known vertical clearances or if the arc is mathematically known.
 - Create several span fixed features with **bridge construction** (CATBRG) = 1 (arch) for one bridge arch.
 - The number of the span fixed features depends on the resolution of the different vertical clearances which shall be provided. The width of the element with the biggest vertical clearance should not be less than the typical width of vessels (12 m for European waterways of CEMT class IVa and above).
 - The areas must not overlap.
 - All of the span fixed features of one arch which are situated within the allowed passage must be aggregated by a **Bridge Arch Association**.
- ii) **Bridge Arch Association** must NOT be included in the **Bridge Aggregation**.



6.8 Span opening

IHO Definition: **SPAN OPENING.** An opening component of the deck of a bridge spanning successive bridge piers. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2013).

S-401 Geo Feature: Span Opening (bridge) (M)

Primitives: Curve, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
See 6.6 bridge	See 6.6 bridge	See 6.6 bridge		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
horizontal clearance fixed			C	0,1
horizontal clearance value	(HORCLR)		(S) RE	1,1
horizontal distance uncertainty	(HORACC)	[xx.xx] (metres), e.g., 1.54	(S) RE	0,1
interoperability identifier		MRN (see clause 27.161)	URN	0,1
vertical clearance closed			C	1,1
vertical clearance value	(VERCCL)	[xx.x] (metres), e.g., 13.2	(S) RE	1,1
vertical uncertainty	(VERACC)		(S) C	0,1
uncertainty fixed		[xx.xx] (metres), e.g., 1.54	(S) RE	1,1
uncertainty variable factor			(S) RE	0,1
vertical clearance open			C	1,1
vertical clearance unlimited			(S) BO	1,1
vertical clearance value	(VERCOP)	[xx.x] (metres), e.g., 23.4	(S) RE	0,1 †
vertical uncertainty	(VERACC)		(S) C	0,1
uncertainty fixed			(S) RE	1,1
uncertainty variable factor			(S) RE	0,1
vertical datum	(VERDAT)	3 : mean sea level 10 : Approximate Lowest Astronomical Tide 12 : Mean Lower Low Water 13 : low water 16 : mean high water 17 : mean high water springs 18 : high water 19 : approximate mean sea level 20 : high water springs 21 : mean higher high water 23 : Lowest Astronomical Tide	EN	0,1

		24 : local datum 25 : international great lakes datum 1985 26 : mean water level 28 : higher high water large tide 29 : nearly highest high water 30 : highest astronomical tide 31 : Local Low Water Reference Level 32 : Local High Water Reference Level 33 : Local Mean Water Reference Level 34 : Equivalent Height of Water (German GIW) 35 : Highest Shipping Height of Water (German HSW) 36 : Reference Low Water Level According to Danube Commission 37 : Highest Shipping Height of Water According to Danube Commission 38 : Dutch River Low Water Reference Level (OLR) 39 : Russian Project Water Level 40 : Russian Normal Backwater Level 41 : Ohio River Datum 43 : Dutch High Water Reference Level 44 : baltic sea chart datum 2000 45 : Dutch Estuary Low Water Reference Level (OLW)		
scale minimum	(SCAMIN)	EUR: 90 000, US: 300 000 or see clause 2.5.9	IN	1,1
information	(INFORM)	See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
pictorial representation	(PICREP)	See clause 2.4.12.2	TE	0,1
bridge construction	(CATBRG)	1 : arch 2 : viaduct 3 : pontoon bridge 4 : suspension bridge 5 : transporter bridge	EN	0,1
category of opening bridge	(CATBRG)	3 : swing bridge 4 : lifting bridge 5 : bascule bridge 7 : drawbridge	EN	1,1

UN Location Code	(unlocd)		TE	0, 1
Category of Temporal Variation	(CATTEV)	4 : Likely to Change 5 : Unlikely to Change 6 : Unassessed	EN	0, 1
Vertical River Datum Reference Level Value	(vcrval)	[xx.xx] (metres), e.g., 1.15	RE	0, 1
Name of Vertical River Datum Reference Level	(vcrlev)		TE	0, 1
Elevation of Water Level	(elevwl)	[xx.xx] (metres), e.g., 12.46	RE	0, 1
Reference Gravitational Level	(reflev)	1 : Baltic Datum 2 : Adriatic Level 3 : Amsterdam Ordnance Datum (NAP) 4 : Mean Sea Level 5 : Other Datum 6 : National Geodetic Vertical Datum - NGVD29 7 : North American Vertical Datum - NAVD88 8 : Mean Sea Level 1912 9 : Mean Sea Level 1929 10 : Tweede Algemene Waterpassing	EN	0, 1
Reference Gauge	(refgag)		TE	0, 1
condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
Reported Date	(SORDAT)		TD	0, 1
Waterway Distance	(wtwdis)	[xxxx.xxx] (units defined in distance unit of measurement), e.g., 2451.732	RE	0, 1
distance unit of measurement	(hunits)	1 : metres 2 : yards 3 : kilometres 4 : statute miles 5: nautical miles 7 : hectometres	EN	0,1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation	(S) EN	0, 1

		2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data		
.....Source	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Component	Bridge Aggregation (see clause 25.3)	Bridge	Association	0,*
The Component	Lock Aggregation (see clause 25.23)	Lock Basin	Association	0,*
The Structure	Structure/Equipment (see clause 25.12)	Daymark, Distance Mark, Fog Signal, Light Air Obstruction, Light All Around, Light Sectored, Notice Mark, Physical AIS Aid to Navigation, Radar Transponder Beacon, Sensor, Signal Station Traffic, Signal Station Warning	Composition	0,1
The Component	Aids to Navigation Association (see clause 25.2)	Fairway System, Traffic Separation Scheme, TwoWay Route	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
	Additional Information (see clause 25.1)	Contact Details, NonStandard Working Day, Service Hours, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

The sub-attribute **vertical clearance value** for the complex attribute **vertical clearance open** is mandatory if the sub-attribute **vertical clearance unlimited** is set to *False*.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

6.8.1 Span opening

If it is required to encode the clearance characteristics (vertical or horizontal) for an opening part of a bridge between piers or supports, it must be done using the feature **Span Opening**, which must be associated with the feature **Bridge** (see clause 6.6) using the association **Bridge Aggregation** (see clause 25.3). See clause 6.6 for examples of **Span Opening** features used in conjunction with **Bridge** features.

The value of the vertical clearance between (high) water level and any opening overhead obstruction must always be given, where known, on the largest optimum display scale IENC data intended for navigation under the overhead obstruction, and for detailed passage planning. The datum above which clearances are given must be a high water level, preferably Highest Astronomical Tide (HAT), where the tide is appreciable. Clearances must be populated using the complex attributes **vertical clearance closed** and **vertical clearance open** for the span and sub-attributes populated relevant to the feature.

Remarks:

- **Span Opening** features should only be encoded if the span is entirely or partly over navigable water at the optimum display scale for the IENC data.
- Where the optimum display scale of the IENC data is such that individual spans over navigable water cannot be indicated, the entire bridge should be covered by a single **Span Opening** feature, having attributes populated according to the opening span.
- The complex attributes **vertical clearance closed** and **vertical clearance open** must be encoded for both the opening (vertical open) and closed (vertical closed) clearance values. Where the open vertical clearance is unlimited, the Boolean sub-attribute **vertical clearance unlimited** must be set to *True*.
- Where it is required to encode time schedule information relating to the opening and closing times for the span, including any scheduled closure times or amended schedules for festivals or national holidays, this should be done using an associated instance of the information types **Service Hours** (see clause 24.2) and/or **Non-Standard Working Day** (see clause 24.3).
- Value 13 (low water) for attribute **vertical datum** is only applicable to enclosed (inland) waterways; and must not be used to indicate the reference datum for vertical clearances in tidal waters.
- Where encoded, an associated instance of the cartographic feature **Text Placement** (see clause 23.1) relates to the positioning of the vertical and/or horizontal clearances for the span, where encoded. If available and considered important for route planning and/or monitoring, the vertical uncertainty associated with encoded vertical clearance values should also be encoded.

Distinction: Bridge; Cable Overhead; Conveyor; Pipeline Overhead; Span Fixed.

Inland specific Encoding Instructions:

- A) All bridge types:
- i) Bridge approaches (over the bankline) should be encoded.

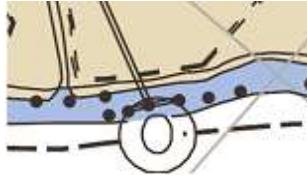
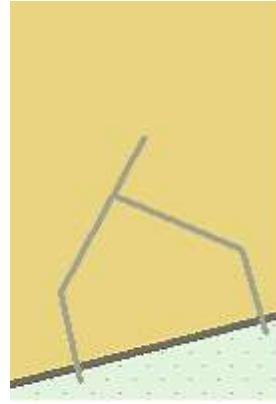
- ii) The ISRS Location Code of a bridge is assigned to each single span feature of the entire bridge (refer to 2.4.13). If a MRN or RIS-ID is available, the attribute **interoperability identifier** must be encoded (refer to **Fehler! Verweisquelle konnte nicht gefunden werden.**).
- iii) Use **vertical datum** (VERDAT) only if vertical datum differs:
 - from DSPM VDAT subfield and
 - from Metadata feature **Vertical Datum of Data** (m_vdat) attribute.
- iv) For time schedule (general) see clause 24.6.
- v) If there is no vertical clearance indicator at a bridge, but there is a gauge which can be used to calculate the vertical clearance of the bridge depending on the water level, it should be encoded in accordance with clause 22.15.
- vi) EUR: If there is a gauge which can be used to calculate the vertical clearance of the bridge, the ISRS Location Code of the gauge shall be encoded in the attribute **reference gauge** (refgag).
- vii) Use **name of vertical river datum reference level** (vcrlev) and **vertical river datum reference level value** (vcrval) if the local value and name of vertical river datum reference level (design waterlevel) is known.
- viii) **bridge construction** (CATBRG) and **category of opening bridge** (CATBRG) have to be encoded for the **Bridge** feature if all spans have the same type. If they have different types the attribute has to be only encoded for the individual spans.
- ix) **Horizontal clearance value** (HORCLR), **vertical clearance closed** (VERCCL) and/or **vertical clearance open** (VERCOP), **waterway distance** (WTWDIS) and **distance unit of measurement** must be encoded for spans over navigable water. **Vertical clearance value** (VERCLR) should not be encoded for spans over non-navigable water.

6.9 Conveyor

IHO Definition: **CONVEYOR.** A mechanical device for conveying bulk material or people using an endless moving belt or series of rollers. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

S-401 Geo Feature: Conveyor (CONVYR, convyr) (C)

Primitives: Curve, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol
 conveyor		
 Aerial cableway		

S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of conveyor	(CATCON)	1 : aerial cableway 2 : belt conveyor 3 : flume 4 : lift/elevator	EN	1,1
colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,* (ordered)
colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1 [†]
condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
feature name		See clause 2.5.8	C	0,*

language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
height	(HEIGHT)		RE	0,1
interoperability identifier		MRN (see clause 27.161)	URN	0,1
lifting capacity	(LIFCAP)		RE	0,1
multiplicity of features			C	0,1
multiplicity known			(S) BO	1,1
number of features			(S) IN	0,1
product	(PRODCT)	4 : stone 5 : coal 6 : ore 10 : bauxite 11 : coke 12 : iron ingots 13 : salt 14 : sand 15 : timber 16 : sawdust/wood chips 17 : scrap metal 21 : cement 22 : grain 25 : clay	EN	0,*
radar conspicuous	(CONRAD)		BO	0,1
reported date	(SORDAT)	See clause 2.4.8	TD	0,1
status	(STATUS)	4 : not in use 12 : illuminated	EN	0,*
vertical clearance fixed			C	0,1 [†]
vertical clearance value	(VERCLR)	[xx.xx] (metres), e.g., 13.27	(S) RE	1,1
vertical uncertainty	(VERACC)		(S) C	0,1
uncertainty fixed		[xx.xx] (metres), e.g., 1.54	(S) RE	1,1
uncertainty variable factor			(S) RE	0,1
vertical datum	(VERDAT)	3 : mean sea level 10 : Approximate Lowest Astronomical Tide 12 : Mean Lower Low Water 13 : low water 16 : mean high water 17 : mean high water springs 18 : high water 19 : approximate mean sea level 20 : high water springs 21 : mean higher high water	EN	0,1

		23 : Lowest Astronomical Tide 24 : local datum 25 : International great lakes datum 1985 26 : mean water level 28 : higher high water large tide 29 : nearly highest high water 30 : highest astronomical tide 31 : Local Low Water Reference Level 32 : Local High Water Reference Level 33 : Local Mean Water Reference Level 34 : Equivalent Height of Water (German GIW) 35 : Highest Shipping Height of Water (German HSW) 36 : Reference Low Water Level According to Danube Commission 37 : Highest Shipping Height of Water According to Danube Commission 38 : Dutch River Low Water Reference Level (OLR) 39 : Russian Project Water Level 40 : Russian Normal Backwater Level 41 : Ohio River Datum 43 : Dutch High Water Reference Level 44 : baltic sea chart datum 2000 45 : Dutch Estuary Low Water Reference Level (OLW)		
<i>vertical length</i>	(VERLEN)		RE	0,1
<i>visual prominence</i>	(CONVIS)	1 : visually conspicuous 2 : not visually conspicuous 3 : prominent	EN	0,1
scale minimum	(SCAMIN)	[EUR: 22000; US: 30000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
<i>pictorial representation</i>	(PICREP)	See clause 2.4.12.2	TE	0,1
Category of Temporal Variation	(CATTEV)	4 : Likely to Change	EN	0, 1

		5 : Unlikely to Change 6 : Unassessed		
Vertical River Datum Reference Level Value	(vcrval)	[xx.xx] (metres), e.g., 1.15	RE	0, 1
Name of Vertical River Datum Reference Level	(vcrlev)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0, *
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 †
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity

The Structure	Structure/Equipment (see clause 25.12)	Daymark, Distance Mark, Fog Signal, Light All Around, Light Sectored, Notice Mark, Physical AIS Aid to Navigation, Radar Transponder Beacon, Signal Station Traffic, Signal Station Warning	Composition	0,1
The Component	Aids to Navigation Association (see clause 25.2)	Fairway System, Traffic Separation Scheme, TwoWay Route	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
	Additional Information (see clause 25.1)	Contact Details, NonStandard Working Day, Service Hours, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] The attribute **colour pattern** is mandatory for conveyors that have more than one value populated for the attribute **colour**.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

For conveyors encoded over navigable water, the attribute **vertical clearance fixed** is mandatory.

6.9.1 Conveyors

If it is required to encode a conveyor, it must be done using the feature **Conveyor**.

The value of the vertical clearance between (high) water level and any fixed overhead obstruction must always be given, where known, on the largest optimum display scale IENC data intended for navigation under the obstruction, and for detailed passage planning. The datum above which clearances are given must be a high water level, preferably Highest Astronomical Tide (HAT), where the tide is appreciable. The value for the vertical clearance must be encoded for conveyors located over navigable water using the complex attribute **vertical clearance fixed**, and sub-attributes populated relevant to the feature.

Remarks:

- If it is required to encode an overhead cable car, it must be done using a **Conveyor** feature, with attribute **category of conveyor** = 1 (aerial cableway).
- In navigable water, conveyor supports must be encoded, where possible, using a **Pylon/Bridge Support** feature (see clause 6.12), with attribute **category of pylon** = 3 (aerial cableway pylon).

- Value 13 (low water) for attribute **vertical datum** is only applicable to enclosed (inland) waterways; and must not be used to indicate the reference datum for vertical clearances in tidal waters.
- If available and considered important for route planning and/or monitoring, the vertical uncertainty associated with encoded vertical clearance values should also be encoded.

Distinction: Cable Overhead; Crane; Pylon/Bridge Support.

Inland specific Encoding Instructions:

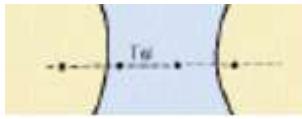
- Place curve feature from land-based facility to fixed structure in water at which product loads or offloads.
- If a conveyor extends over navigable water it has to be encoded.
- Use **name of vertical river datum reference level (VCRLEV)** and **vertical river datum reference level value (VCRVAL)** if the local value and name of vertical river datum reference level (design waterlevel) is known.
- Aerial cableway
 - If an aerial cableway extends over navigable water it has to be encoded.
 - For an aerial cableway for the transport of people the attribute **product** (PRODCT) should not be encoded. If the **feature name** (OBJNAM) doesn't show that it is an aerial cableway for the transport of people, the information can be encoded in the attribute **information text** (INFORM).
 - Cable supports (**Pylon/Bridge Support** (PYLONS), **category of pylon** (CATPYL) = 3 closest to the landside of the bank line and those within the water must be coded.
 - The **vertical clearance value** (VERCLR) shall be provided in metres and indicate the vertical distance between the lowest car or bucket (over the navigable part of the waterway) and a defined high water level (e.g. highest shipping height of water) if available.
 - If there is no vertical clearance indicator at the cableway, but there is a gauge which can be used to calculate the vertical clearance of the cableway depending on the water level, it should be encoded in accordance with 22.15.
 - EUR: If there is a gauge which can be used to calculate the vertical clearance of the cableway, the ISRS location code of the gauge shall be encoded in the attribute **reference gauge** (refgag).
 - Use **name of vertical river datum reference level** (vcrlev) and **vertical river datum reference level value** (vcrval) if the local value and name of vertical river datum reference level (design waterlevel) is known.

6.10 Cable overhead

IHO Definition: **OVERHEAD CABLE.** A single continuous rope-like bundle consisting of multiple strands of fiber, plastic, metal, and/or glass, which is supported by structures such as poles or pylons and passing over or nearby navigable waters. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2012).

S-401 Geo Feature: Cable Overhead (cblohd) (M)

Primitives: Curve

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol
		

S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of cable	(CATCBL)	1 : power line 3 : transmission line 6 : Mooring Cable 7 : Ferry 10 : telecommunications cable	EN	1,1
condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
<i>fixed date range</i>		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
ice factor	(ICEFAC)		RE	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

interoperability identifier		MRN (see clause 27.161)	URN	0,1
<i>multiplicity of features</i>			C	0,1
multiplicity known			(S) BO	1,1
number of features			(S) IN	0,1
<i>radar conspicuous</i>	(CONRAD)		BO	0,1
reported date	(SORDAT)	See clause 2.4.8	TD	0,1
<i>status</i>	(STATUS)	1 : permanent 4 : not in use 5 : periodic/intermittent 7 : temporary 12 : illuminated 28 : buoyed	EN	0,*
vertical clearance fixed			C	1,1 [†]
vertical clearance value	(VERCLR)	[xx.x] (metres), e.g., 13.2	(S) RE	1,1
vertical uncertainty	(VERACC)		(S) C	0,1
uncertainty fixed		[xx.xx] (metres), e.g., 1.54	(S) RE	1,1
uncertainty variable factor			(S) RE	0,1
vertical clearance safe			C	0,1 [†]
vertical clearance value	(VERCSA)		(S) RE	1,1
vertical uncertainty	(VERACC)		(S) C	0,1
uncertainty fixed		[xx.xx] (metres), e.g., 1.54	(S) RE	1,1
uncertainty variable factor			(S) RE	0,1
vertical datum	(VERDAT)	3 : mean sea level 10 : Approximate Lowest Astronomical Tide 12 : Mean Lower Low Water 13 : low water 16 : mean high water 17 : mean high water springs 18 : high water 19 : approximate mean sea level 20 : high water springs 21 : mean higher high water 23 : Lowest Astronomical Tide 24 : local datum 25 : international great lakes datum 1985 26 : mean water level 28 : higher high water large tide 29 : nearly highest high water 30 : highest astronomical tide 31 : Local Low Water Reference Level 32 : Local High Water Reference Level 33 : Local Mean Water Reference Level	EN	0,1

		34 : Equivalent Height of Water (German GIW) 35 : Highest Shipping Height of Water (German HSW) 36 : Reference Low Water Level According to Danube Commission 37 : Highest Shipping Height of Water According to Danube Commission 38 : Dutch River Low Water Reference Level (OLR) 39 : Russian Project Water Level 40 : Russian Normal Backwater Level 41 : Ohio River Datum 43 : Dutch High Water Reference Level 44 : baltic sea chart datum 2000 45 : Dutch Estuary Low Water Reference Level (OLW)		
<i>visual prominence</i>	(CONVIS)	1 : visually conspicuous 2 : not visually conspicuous 3 : prominent	EN	0,1
scale minimum	(SCAMIN)	[EUR: 45000; US: 90000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(/INFORM) (/NINFORM)		(S) TE	0,1 †
UN Location Code	(unlocd)		TE	0, 1
Category of Temporal Variation	(CATTEV)	4 : Likely to Change 5 : Unlikely to Change 6 : Unassessed	EN	0, 1
Name of Vertical River Datum Reference Level	(vcrlev)		TE	0, 1
Vertical River Datum Reference Level Value	(vcrval)	[xx.xx] (metres), e.g., 1.15	RE	0, 1
Reference Gauge	(refgag)		TE	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Waterway Distance	(wtwdis)	[xxxx.xxx] (units defined in distance unit of measurement), e.g., 2451.732	RE	0, 1
distance unit of measurement	(hunits)	1 : metres 2 : yards 3 : kilometres	EN	0,1

		4 : statute miles 5: nautical miles 7 : hectometres		
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Component	Bridge Aggregation (see clause 25.3)	Bridge	Aggregation	0,1
The Component	Barrage Association (see clause 0)	Dam	Association	0,*
The Component	Lock Aggregation (see clause 25.23)	Lock Basin	Association	0,*
The Collection	Overhead Cable Aggregation (see clause 0)	Notice Mark, Pylon/Bridge Support, Radar Reflector.	Aggregation	0,*

		Shoreline Construction, Waterway Gauge		
The Component	Tunnel Aggregation (see clause 25.27)	Tunnel	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] For overhead cables over navigable water, one of the attributes **vertical clearance fixed** or **vertical clearance safe** must be populated.

At least one of the sub-attributes **date end** or **date start** must be populated.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

6.10.1 Overhead cables

If it is required to encode an overhead cable, it must be done using the feature **Cable Overhead**. The value of the vertical clearance between (high) water level and any fixed overhead obstruction must always be given, where known, on the largest optimum display scale IENC data intended for navigation under the obstruction, and for detailed passage planning. The datum above which clearances are given must be a high water level, preferably Highest Astronomical Tide (HAT), where the tide is appreciable. The value for the vertical clearance must be encoded using the complex attributes **vertical clearance fixed** or **vertical clearance safe**, and sub-attributes populated relevant to the feature.

For power cables or transmission lines carrying very high voltages, an additional vertical clearance of from 2 to 5 metres may be needed to avoid an electrical discharge. When known, the authorised safe clearance (known as the safe vertical clearance), which is the physical clearance minus a safety margin, must be populated using **vertical clearance safe**, having the sub-attribute **vertical clearance value** populated with the safe clearance value.

Remarks:

- If it is required to encode telepheric cables, this must be done using **Conveyor** features (see clause 6.9), with attribute CATCON = 1 (aerial cableway).
- Where a cable has radar reflectors at known positions, they may be encoded as separate **Radar Reflector** features (see clause 20.15). If the whole cable is radar conspicuous, the optimum display scale for the IENC data is too small to show individual reflectors, or the positions of the radar reflectors are not known, the **Cable Overhead** should be encoded with attribute **radar conspicuous**.
- In navigable water, overhead cable supports must be encoded, where possible, using a **Pylon/Bridge Support** feature (see clause 6.12), with attribute **category of pylon** = 1 or 2.
- Value 13 (low water) for attribute **vertical datum** is only applicable to enclosed (inland) waterways; and must not be used to indicate the reference datum for vertical clearances in tidal waters.
- If available and considered important for route planning and/or monitoring, the vertical uncertainty associated with encoded vertical clearance values should also be encoded.

Distinction: Cable Area; Cable Submarine; Conveyor; Pylon/Bridge Support.

Inland specific Encoding Instructions:

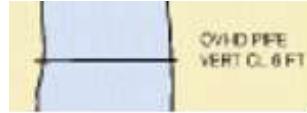
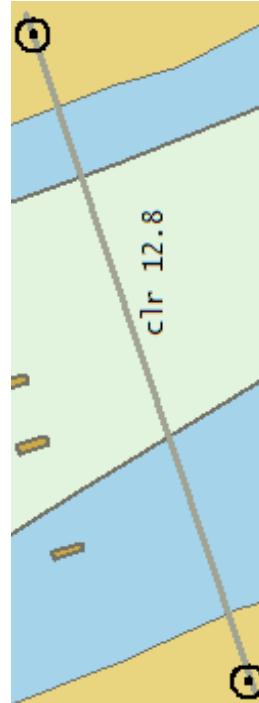
- A) The value given as the **vertical clearance** (VERCLR) shall be provided in metres and indicate the vertical distance between the lowest point of the cable (over the navigable part of the waterway) and a defined high water level (e.g. highest shipping height of water) if available.
- B) If there are multiple cables in the same area, represent only the lowest hanging cable.
- C) Cable supports (**Pylon/Bridge Support** (PYLONS), **category of pylon** (CATPYL) = 1 or 2) closest to the landside of the bank line and those within the water must be coded.
- D) **Feature name** (OBJNAM) should only be used if the name is relevant for navigation; otherwise use **information** (INFORM)
- E) If there is no vertical clearance indicator at a bridge, but there is a gauge which can be used to calculate the vertical clearance of the bridge depending on the water level, it should be encoded in accordance with clause to be amended
- F) An overhead cable connected to a bridge must be encoded if it is within a navigable opening. This feature may be associated to a bridge by a **Bridge Aggregation**.
- G) EUR: If there is a gauge which can be used to calculate the vertical clearance of the bridge, the ISRS location code of the gauge shall be encoded in the attribute **reference gauge** (REFGAG).
- H) Use **name of vertical river datum reference level** (VCRLEV) and **vertical river datum reference level value** (VCRVAL) if the local value and name of vertical river datum reference level (design waterlevel) is known.
- I) If it is required to encode telepherics cables, this must be done using **Conveyor** features with attribute **category of conveyor** (CATCON) = 1 (aerial cableway), see 6.9.

6.11 Pipeline overhead

IHO Definition: **OVERHEAD PIPELINE.** A string of interconnected pipes, supported by pylons and passing over or nearby navigable waters, used for the transport of matter, nowadays mainly oil or gas. (Adapted from IHO Dictionary – S-32 and S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.119, November 2000).

S-401 Geo Feature: Pipeline Overhead (pipohd) (C)

Primitives: Curve

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol
		

S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of pipeline/pipe	(CATPIP)	2 : outfall pipe 3 : intake pipe 4 : sewer 6 : supply pipe	EN	1,1
condition	(CONDTN)	1 : under construction 2 : Ruined 3 : Under Reclamation 5 : planned construction	EN	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 ⁺
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 ⁺
date start	(DATSTA)		(S) TD	0,1 ⁺

interoperability identifier		MRN (see clause 27.161)	URN	0,1
<i>multiplicity of features</i>			C	0,1
multiplicity known			(S) BO	1,1
number of features			(S) IN	0,1
product	(PRODCT)	1 : oil 2 : gas 3 : water 7 : chemicals 8 : drinking water 9 : milk 18 : liquefied natural gas 19 : liquefied petroleum gas 20 : wine 22 : grain	EN	0,*
<i>radar conspicuous</i>	(CONRAD)		BO	0,1
reported date	(SORDAT)	See clause 2.4.8	TD	0,1
<i>status</i>	(STATUS)	1 : permanent 4 : not in use 7 : temporary 12 : illuminated	EN	0,*
vertical clearance fixed			C	1,1 †
vertical clearance value	(VERCLR)	[xx.xx] (metres), e.g., 13.27	(S) RE	1,1
vertical uncertainty	(VERACC)		(S) C	0,1
uncertainty fixed		[xx.xx] (metres), e.g., 1.54	(S) RE	1,1
uncertainty variable factor			(S) RE	0,1
vertical datum	(VERDAT)	3 : mean sea level 10 : Approximate Lowest Astronomical Tide 12 : Mean Lower Low Water 13 : low water 16 : mean high water 17 : mean high water springs 18 : high water 19 : approximate mean sea level 20 : high water springs 21 : mean higher high water 23 : Lowest Astronomical Tide 24 : local datum 25 : International great lakes datum 1985 26 : mean water level 28 : higher high water large tide 29 : nearly highest high water 30 : highest astronomical tide 31 : Local Low Water Reference Level 32 : Local High Water Reference Level	EN	0,1

		33 : Local Mean Water Reference Level 34 : Equivalent Height of Water (German GIW) 35 : Highest Shipping Height of Water (German HSW) 36 : Reference Low Water Level According to Danube Commission 37 : Highest Shipping Height of Water According to Danube Commission 38 : Dutch River Low Water Reference Level (OLR) 39 : Russian Project Water Level 40 : Russian Normal Backwater Level 41 : Ohio River Datum 43 : Dutch High Water Reference Level 44 : baltic sea chart datum 2000 45 : Dutch Estuary Low Water Reference Level (OLW)		
<i>visual prominence</i>	(CONVIS)	1 : visually conspicuous 2 : not visually conspicuous 3 : prominent	EN	0,1
scale minimum	(SCAMIN)	[EUR: 22000; US: 90000] or see clause 2.5.9	IN	1,1
information	(INFORM)	See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
UN Location Code	(unlocd)		TE	0, 1
Category of Temporal Variation	(CATTEV)	4 : Likely to Change 5 : Unlikely to Change 6 : Unassessed	EN	0, 1
Name of Vertical River Datum Reference Level	(vcrlev)		TE	0, 1
Vertical River Datum Reference Level Value	(vcrval)	[xx.xx] (metres), e.g., 1.15	RE	0, 1
Reference Gauge	(refgag)		TE	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Waterway Distance	(wtwdis)	[xxxx.xxx] (units defined in distance unit of measurement), e.g., 2451.732	RE	0, 1

distance unit of measurement	(hunits)	1 : metres 2 : yards 3 : kilometres 4 : statute miles 5: nautical miles 7 : hectometres	EN	0,1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0, *
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 †
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Component	Bridge Aggregation (see clause 25.3)	Bridge	Aggregation	0,1
The Component	Barrage Association (see clause 0)	Dam	Association	0, *
The Component	Lock Aggregation (see clause 25.23)	Lock Basin	Association	0, *

The Component	Tunnel Aggregation (see clause 25.27)	Tunnel	Association	0,*
The Collection	Overhead Pipeline Aggregation (see clause 0)	Notice Mark, Pylon/Bridge Support, Radar Reflector, Shoreline Construction, Waterway Gauge	Aggregation	0,*
The Structure	Structure/Equipment (see clause 25.12)	Light Sectored	Composition	0,1
The Component	Aids to Navigation Association (see clause 25.2)	Fairway System, Traffic Separation Scheme, TwoWay Route	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] For overhead pipelines over navigable water, the attribute **vertical clearance fixed** is mandatory.

At least one of the sub-attributes **date end** or **date start** must be populated.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

6.11.1 Overhead pipelines

If it is required to encode an overhead pipeline passing over or nearby navigable waters, it must be done using the feature **Pipeline Overhead**.

The value of the vertical clearance between (high) water level and any fixed overhead obstruction must always be given, where known, on the largest optimum display scale IENC data intended for navigation under the obstruction, and for detailed passage planning. The datum above which clearances are given must be a high water level, preferably Highest Astronomical Tide (HAT), where the tide is appreciable. The value for the vertical clearance must be encoded using the complex attribute **vertical clearance fixed**, and sub-attributes populated relevant to the feature,).

Remarks:

- Where an overhead pipeline is disused, it should be encoded with the attribute **status** = 4 (not in use), and the attributes **category of pipe** and **product** must not be encoded.
- Where a pipeline has radar reflectors at known positions, they must be encoded as separate **Radar Reflector** features (see clause 20.15). If the whole pipeline is radar conspicuous, the optimum display scale for the IENC data is too small to show individual reflectors, or the positions of the radar reflectors are not known, the **Pipeline Overhead** should be encoded with attribute **radar conspicuous**.
- In navigable water, overhead pipeline supports must be encoded, where possible, using a **Pylon/Bridge Support** feature (see clause 6.12), with attribute **category of pylon** = 6 (pipeline pylon).
- Value 13 (low water) for attribute **vertical datum** is only applicable to enclosed (inland) waterways; and must not be used to indicate the reference datum for vertical clearances in tidal waters.

- If available and considered important for route planning and/or monitoring, the vertical uncertainty associated with encoded vertical clearance values should also be encoded.

Distinction: Pipeline Submarine/On Land, Submarine Pipeline Area.

Inland specific Encoding Instructions:

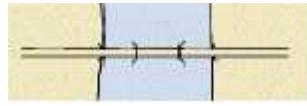
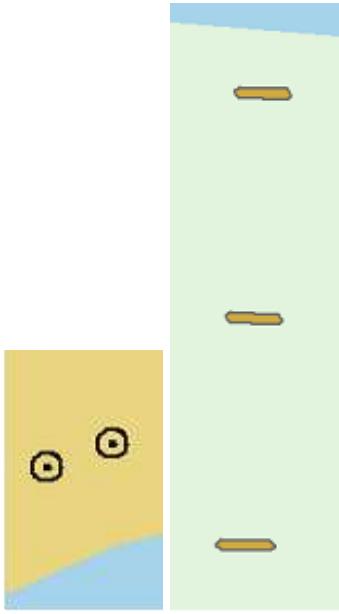
- A) Pipeline supports (PYLONS) closest to the land side of the shoreline and those within the water must be coded.
- B) Pipelines should extend over **Coastline** (COALNE) onto land a short distance.
- C) An overhead pipeline over navigable water has to be encoded unless it is on a bridge, does not affect **vertical clearance fixed** (VERCLR) and **product** (PRODCT) is not 1 (oil), 2 (gas) or 7 (chemicals).
- D) Overhead pipelines and cables may have significant towers that should be captured as “tower” [**Landmark** (LNDMRK) with **category of landmark** (CATLMK)=17(tower)].
- E) Lights on the towers should be encoded.
- F) The value given as the **vertical clearance fixed** (VERCLR) shall be provided in metres and indicate the vertical distance between the lowest point of the cable (over the navigable part of the waterway) and a defined high water level (e.g. highest shipping height of water) if available.
- G) The vertical clearances must refer to either the vertical datum given in the DSPM VDAT subfield or to the vertical datum given in the Metadata Feature (M_VDAT) if it is not the same as in the DSPM VDAT subfield.
- H) **Feature name** (OBJNAM) should only be used if the name is relevant for navigation; otherwise use **information** (INFORM).
- I) If there is no vertical clearance indicator at an overhead pipe, but there is a gauge which can be used to calculate the vertical clearance of the overhead pipe depending on the water level, it should be encoded in accordance with clause 22.4.
- J) EUR: If there is a gauge which can be used to calculate the vertical clearance of the overhead pipe, the gauge name shall be encoded in the attribute **reference gauge** (REFGAG). When the attribute **interoperability identifier** of the gauge has been encoded (see **Fehler! Verweisquelle konnte nicht gefunden werden.**), the MRN of the gauge shall be encoded in the attribute **reference gauge** (refgag).
- K) Use **name of vertical river datum reference level** (VCRLEV) and **vertical river datum reference level value** (VCRVAL) if the local value and name of vertical river datum reference level (design waterlevel) is known.

6.12 Pylon/bridge support

IHO Definition: **PYLON/BRIDGE SUPPORT.** A vertical construction consisting, for example, of a steel framework or pre-stressed concrete to carry cables, a bridge, etc. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.125, November 2000).

S-401 Geo Feature: Pylon/Bridge Support (PYLONS) (C)

Primitives: Point, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol
		

S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of pylon	(CATPYL)	1 : power transmission pylon/pole 2 : telephone/telegraph pylon/pole 3 : aerial cableway pylon 4 : bridge pylon/tower 5 : bridge pier 6 : pipeline pylon	EN	1,1
colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,* (ordered)

<i>colour pattern</i>	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1 †
<i>condition</i>	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
<i>feature name</i>		See clause 2.5.8	C	0,*
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 †
<i>fixed date range</i>		See clause 2.4.8	C	0,1
<i>date end</i>	(DATEND)		(S) TD	0,1 †
<i>date start</i>	(DATSTA)		(S) TD	0,1 †
<i>height</i>	(HEIGHT)		RE	0,1
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>multiplicity of features</i>			C	0,1
<i>multiplicity known</i>			(S) BO	1,1
<i>number of features</i>			(S) IN	0,1
<i>nature of construction</i>	(NATCON)	1 : masonry 2 : concreted 6 : wooden 7 : metal 11 : latticed	EN	0,*
<i>radar conspicuous</i>	(CONRAD)		BO	0,1
<i>reported date</i>	(SORDAT)	See clause 2.4.8	TD	0,1
<i>status</i>	(STATUS)	4 : not in use 12 : illuminated	EN	0,*
<i>vertical length</i>	(VERLEN)		RE	0,1
<i>visual prominence</i>	(CONVIS)	1 : visually conspicuous 2 : not visually conspicuous 3 : prominent	EN	0,1
<i>water level effect</i>	(WATLEV)	1 : partly submerged at high water 2 : always dry 3 : always under water/ submerged 4 : covers and uncovers 5 : awash 6 : subject to inundation or flooding	EN	0,1
<i>scale minimum</i>	(SCAMIN)	[EUR: 22000; US: 30000] or see clause 2.5.9	IN	1,1

<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFOM)		(S) TE	0,1 †
<i>pictorial representation</i>	(PICREP)	See clause 2.4.12.2	TE	0,1
Vertical Uncertainty	(VERACC)	[xx.xx] (metres), e.g., 1.54	C	0, 1
Uncertainty Fixed	(POSACC) (SOUACC) (VERACC)		(S) RE	1, 1
Uncertainty Variable Factor			(S) RE	0, 1
Category of Temporal Variation	(CATTEV)	4 : Likely to Change 5 : Unlikely to Change 6 : Unassessed	EN	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*

language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Component	Bridge Aggregation (see clause 25.3)	Bridge	Association	0,*
The Structure	Structure/Equipment (see clause 25.12)	Bollard, Daymark, Distance Mark, Fog Signal, Light Air Obstruction, Light All Around, Light Sectored, Notice Mark, Physical AIS Aid to Navigation, Radar Transponder Beacon, Signal Station Traffic, Signal Station Warning	Composition	0,1
The Component	Aids to Navigation Association (see clause 25.2)	Fairway System, Traffic Separation Scheme, TwoWay Route	Association	0,*
The Roofed Support	Roofed Structure Aggregation (see clause 25.10)	Structure Over Navigable Water	Association	0,*
The Component	Overhead Cable Aggregation (see clause 0)	Cable Overhead	Association	0,*
The Component	Overhead Pipeline Aggregation (see clause 0)	Pipeline Overhead	Association	0,*
The Collection	Notice Mark Aggregation (see clause 0)	Notice Mark	Aggregation	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] The attribute **colour pattern** is mandatory for pylons that have more than one value populated for the attribute **colour**.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

6.12.1 Pylons and bridge supports

The actual position of pylons supporting bridges, pipelines and cables must be indicated on at least the largest optimum display scale IENC data, where they are positioned in the navigable channel or where likely to be useful for position-fixing.

Remarks:

- A **Pylon/Bridge Support** feature of type surface with attribute **water level effect** = 1, 2 or 6 must be covered by a **Land Area** feature of type surface (see clause 5.4).

Distinction: Landmark.

Inland specific Encoding Instructions:

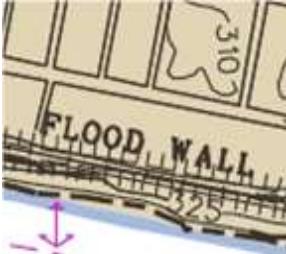
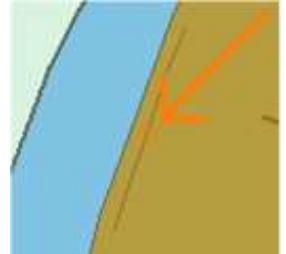
- A) Use **Pylon/Bridge Support (PYLONS)** (P) features to code supports for overhead cables and pipelines (**category of pylon** (CATPYL)=1,2,3).
- B) **Pylon/Bridge Support (PYLON)** (S) must have a **Land Area** (LNDARE) underneath
- C) Pylons and bridge piers in the water and on land closest to the water must be encoded.
- D) For suspension bridges use **category of pylon** (CATPYL) = 4 (bridge pylon/tower)
For all other bridges use **category of pylon** (CATPYL) = 5 (bridge pier)

6.13 Fence/wall

IHO Definition: **FENCE/WALL**. A man-made barrier used as an enclosure or boundary or for protection. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2013).

S-401 Geo Feature: Fence/Wall (FNCLNE) (O)

Primitives: Curve

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol
 		

S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of fence	(CATFNC)	1 : fence 3 : hedge 4 : wall	EN	1,1
colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,* (ordered)
colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1 [†]
condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
elevation	(ELEVAT)		RE	0,1
feature name		See clause 2.5.8	C	0,*

<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
<i>height</i>	(HEIGHT)		RE	0,1
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>nature of construction</i>	(NATCON)	1 : masonry 2 : concreted 3 : loose boulders 6 : wooden 7 : metal 11 : latticed	EN	0,*
<i>radar conspicuous</i>	(CONRAD)		BO	0,1
<i>reported date</i>	(SORDAT)	See clause 2.4.8	TD	0,1
<i>status</i>	(STATUS)	1 : permanent 7 : temporary 12 : illuminated 13 : historic	EN	0,*
<i>vertical length</i>	(VERLEN)		RE	0,1
<i>visual prominence</i>	(CONVIS)	1 : visually conspicuous 2 : not visually conspicuous 3 : prominent	EN	0,1
<i>scale minimum</i>	(SCAMIN)	[EUR: 12000; US: 18750] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
<i>file locator</i>			(S) TE	0,1
<i>file reference</i>	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
<i>headline</i>			(S) TE	0,1
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>text</i>	(INFORM) (NINFORM)		(S) TE	0,1 [†]
<i>Pictorial Representation</i>	(PICREP)		TE	0,1
<i>Source Indication</i>			C	0,1
<i>Reported Date</i>			(S) TD	0,1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0,1

.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0, *
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0, *
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
	Additional Information (see clause 25.1)	Nautical Information	Association	0, *
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0, *

† The attribute **colour pattern** is mandatory for fences or walls that have more than one value populated for the attribute **colour**.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

6.13.1 Fences and walls

If it is required to encode a fence or wall, it must be done using the feature **Fence/Wall**.

Remarks:

- No remarks.

Distinction: Fortified Structure.

Inland specific Encoding Instructions:

- A) Fences, which are highly relevant for calamity abatement or for the access to navigation facilities, might be encoded.

- B) Floodwalls can be encoded as **Fence/Wall** (FNCLNE), **category of fence** (CATFNC) = 4 (wall), **information text** (INFORM) = floodwall
- C) If a structured external XML-file with more detailed communication information regarding access to the fenced area is available, the reference to the file has to be entered in the **file reference** (TXTDSC) attribute.
- D) If the fence or flood gate has a special time schedule or special operating hours apply, the feature can be combined with a time schedule. For this purpose please refer to the **Time Schedule – In General** feature (tisdge) see 24.6.
- E) US: For **feature name** (OBJNAM) use name of floodwall (e.g., Southwest Jefferson County floodwall)

6.14 Railway

IHO Definition: **RAILWAY**. A rail or set of parallel rails on which a train, tram, or rail wagon runs. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

S-401 Geo Feature: Railway (RAILWY) (C)

Primitives: Curve

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
height	(HEIGHT)		RE	0,1
interoperability identifier		MRN (see clause 27.161)	URN	0,1
reported date	(SORDAT)	See clause 2.4.8	TD	0,1
status	(STATUS)	1 : permanent 4 : not in use 6 : reserved 12 : illuminated 13 : historic 14 : public	EN	0,*
scale minimum	(SCAMIN)	[EUR: 45000; US: 15000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 [†]
Pictorial Representation	(PICREP)		TE	0, 1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1

<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0, *
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 †
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0, *
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0, *
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0, *
† For each instance of information , at least one of the sub-attributes file reference or text must be populated.				
Complex attribute feature name , sub-attribute name usage is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.				

6.14.1 Railways

In urbanized areas, depiction of railways within some miles of the coast is part of the IENC's function in giving a general indication of the degree of land development. In largely undeveloped areas, the depiction of railways to isolated ports draws attention to such ports and may be of some interest for transport purposes. Railways should be encoded on larger and medium optimum display scale IENC data.

Where railways run just inshore of the shoreline, or down to it, together with associated bridges, signal posts and other structure, they provide essential identification features. It should not generally be necessary to depict the smaller associated features - posts, gantries etc.

If it is required to encode a railway, it must be done using the feature **Railway**.

Remarks:

- If it is required to encode a railway station, it must be done using a **Building** feature, with attribute **function** = 8 (railway station). On the largest optimum display scale IENC data, the names of railway terminals or main stations may be populated using the attribute **feature name** for the **Building**.
- Abandoned railways (those which are mostly still intact) should be encoded, if required, as **Railway** with the attribute **status** = 4 (not in use).

Distinction: Road; Shoreline Construction; Tunnel.

Inland specific Encoding Instructions:

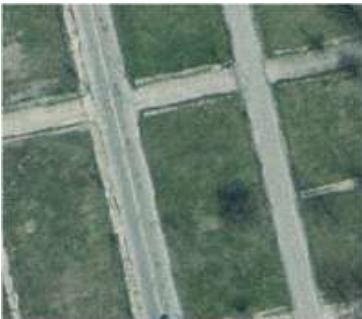
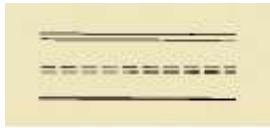
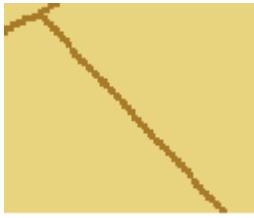
- A) Switching yards and groups of spur lines should be coded as **Land Region** (LNDRGN) (S) features. If appropriate, code **information text** (INFORM) = Switching yard.
- B) It is recommended that minimal **Railway** (RAILWY) features be collected in a **Built-up Area** (BUAARE).
- C) Switching yards may be defined by the external rail lines defining the yard with the **Land Region** (LNDRGN) placed within.
- D) Include railroads where vessels can see the train lights and traffic control lights from the water.
- E) Railways on bridges shall not be encoded.

6.15 Road

IHO Definition: **ROAD.** A route with a specially prepared surface that is intended for use by wheeled vehicles or pedestrians. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2013).

S-401 Geo Feature: Road (ROADWY) (C)

Primitives: Curve, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol
		

S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of road	(CATROD)	1 : motorway 2 : major road 3 : minor road 4 : track/path 5 : major street 6 : minor street	EN	1,1
condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
interoperability identifier		MRN (see clause 27.161)	URN	0,1
nature of construction	(NATCON)	4 : hard surfaced 5 : unsurfaced	EN	0,1
reported date	(SORDAT)	See clause 2.4.8	TD	0,1

<i>status</i>	(STATUS)	1 : permanent 4 : not in use 6 : reserved 7 : temporary 8 : private 12 : illuminated 13 : historic 14 : public	EN	0,*
scale minimum	(SCAMIN)	[EUR: 45000; US: 15000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1

.....Source	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

† Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

6.15.1 Roads and tracks

On the largest optimum display scale continuous coastal series of IENCs, and larger optimum display scale IENC data, all roads and tracks running down to the coastline should be encoded where the optimum display scale permits. Particular attention must be given to local roads serving minor piers, boat hauls and landings. Inland, major roads within a few miles of the coast should be encoded to give a general indication of the degree of development, but tracks and all or some of the minor roads should be omitted. In largely undeveloped areas, with very few roads, it may be desirable to encode even minor roads inland.

On smaller optimum display scale IENC data, roads must be omitted.

If it is required to encode a road or track, it must be done using the feature **Road**.

Remarks:

- No remarks

Distinction: Causeway; Railway.

Inland specific Encoding Instructions:

- A) Only interstates, highways, major roads and roads providing access to the river should be collected.
- B) In **Built-up Areas** (BUAARE), with exception to roads providing access to the waterfront, **Roads** (ROADWY) should be restricted to a set of routes representative of the urban layout.
- C) **Roads** should be collected to the limits of the IENC buffer.
- D) Unless the feature represents an access route useful to vessels, **Road** (ROADWY) features need not have complete or accurate topology.
- E) Road fragments clipped by the IENC Buffer Zone should be removed.

- F) **Roads** should be encoded as curve features but may also be encoded as surfaces.
- G) Include **Roads** where vessels can see the vehicle lights and traffic control lights from the water.
- H) Roads on bridges shall not be encoded.

6.16 Tunnel

IHO Definition: TUNNEL. A passage that is open to the atmosphere at both ends, buried under the seabed or laid over the seafloor or bored under the ground or through mountains. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.191, November 2000).

S-401 Geo Feature: Tunnel (TUNNEL) (C)

Primitives: Curve, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol
		

S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 ⁺
horizontal clearance fixed			C	0,1
horizontal clearance value	(HORCLR)	[xx.x] (metres), e.g., 34.2	(S) RE	1,1
horizontal distance uncertainty	(HORACC)	[xx.xx] (metres), e.g., 1.54	(S) RE	0,1
interoperability identifier		MRN (see clause 27.161)	URN	0,1
reported date	(SORDAT)	See clause 2.4.8	TD	0,1
status	(STATUS)	1 : permanent 3 : recommended 4 : not in use 6 : reserved 8 : private 14 : public	EN	0,*
vertical clearance fixed			C	0,1

vertical clearance value	(VERCLR)	[xx.xx] (metres), e.g., 13.27	(S) RE	1,1
vertical uncertainty	(VERACC)		(S) C	0,1
uncertainty fixed		[xx.xx] (metres), e.g., 1.54	(S) RE	1,1
uncertainty variable factor			(S) RE	0,1
vertical datum	(VERDAT)	3 : mean sea level 10 : Approximate Lowest Astronomical Tide 12 : Mean Lower Low Water 13 : low water 16 : mean high water 17 : mean high water springs 18 : high water 19 : approximate mean sea level 20 : high water springs 21 : mean higher high water 23 : Lowest Astronomical Tide 24 : local datum 25 : international great lakes datum 1985 26 : mean water level 28 : higher high water large tide 29 : nearly highest high water 30 : highest astronomical tide 31 : Local Low Water Reference Level 32 : Local High Water Reference Level 33 : Local Mean Water Reference Level 34 : Equivalent Height of Water (German GIW) 35 : Highest Shipping Height of Water (German HSW) 36 : Reference Low Water Level According to Danube Commission 37 : Highest Shipping Height of Water According to Danube Commission 38 : Dutch River Low Water Reference Level (OLR) 39 : Russian Project Water Level 40 : Russian Normal Backwater Level 41 : Ohio River Datum 43 : Dutch High Water Reference Level 44 : baltic sea chart datum 2000 45 : Dutch Estuary Low Water Reference Level (OLW)	EN	0,1
scale minimum	(SCAMIN)	[EUR: 22000; US: 45000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1

file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
<i>pictorial representation</i>	(PICREP)	See clause 2.4.12.2	TE	0,1
buried depth	(BURDEP)	[xx.x] (metres), e.g., 2.5	RE	0,1
UN Location Code	(unloacd)		TE	0, 1
Category of Temporal Variation		4 : Likely to Change 5 : Unlikely to Change 6 : Unassessed	EN	0, 1
Vertical River Datum Reference Level Value	(vcrval)	[xx.xx] (metres), e.g., 1.15	RE	0, 1
Name of Vertical River Datum Reference Level	(vcrlev)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1

name usage			1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
Feature Associations					
S-401 Role	Association Type	Associated to	Type	Multiplicity	
The Collection	Tunnel Aggregation (see clause x)	Cable Overhead, Communication Area, Notice Mark, Pipeline Overhead, Radio Calling-In Point, Restricted Area, Shoreline Construction, Signal Station Traffic, Signal Station Warning, Waterway Gauge	Aggregation	0,*	
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*	
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1	
	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*	
-	Spatial Association (see clause 25.15)	Spatial Quality	Association	0,*	

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

6.16.1 Tunnels

If it is required to encode a tunnel, it must be done using the feature **Tunnel**.

Remarks:

- If there is a waterway inside the tunnel, and the waterway is navigable at the optimum display scale for the IENC data, it must be encoded as if it were a navigable canal (see clause 8.9.1), using the features **Depth Area** or **Dredged Area** in conjunction with the **Tunnel** feature. There must be no **Land Area** feature in the area covering the waterway.
- If it is required to encode a waterway inside a tunnel that is not navigable at the optimum display scale for the IENC data, it must be done using the feature **Canal** (see clause 8.9) in conjunction with the **Tunnel** feature. A **Land Area** feature must cover the tunnel. The complex attributes **horizontal clearance fixed** and **vertical clearance fixed** must not be encoded on the **Tunnel** feature in this case.
- If it is required to encode a tunnel that has no waterway inside it (but a railway, road etc), only the **Tunnel** feature must be encoded (the section of railway or road inside the tunnel must not be encoded), covered by **Land Area**, **Depth Area**, **Dredged Area** or **Unsurveyed Area** features as appropriate. The complex attributes **horizontal clearance fixed** and **vertical clearance fixed** must not be encoded on the **Tunnel** feature in this case.
- Value 13 (low water) for attribute **vertical datum** is only applicable to enclosed (inland) waterways; and must not be used to indicate the reference datum for vertical clearances in tidal waters.
- If available and considered important for route planning and/or monitoring, the vertical uncertainty associated with encoded vertical clearance values should also be encoded.

Distinction: Railway; Road.

Inland specific Encoding Instructions:

- A) If a structured external XML-file with more detailed communication information is available, the reference to the file has to be entered in the **file reference** (TXTDSC) attribute.
- B) If the navigable tunnel has a special time schedule or special operating hours apply, the feature can be combined with a time schedule. For this purpose please refer to the **Time Schedule - In General** feature (tisdge) see 24.6.
- C) **Tunnel** (TUNNEL) shall be encoded if:
 - anchoring is prohibited over the tunnel or
 - the tunnel is navigable i.,e. has a **Depth Area** (DEPARE, depare) or **Dredged Area** (DRGARE)
- D) Use **name of vertical river datum reference level** (VCRLEV) and **vertical river datum reference level value** (VCRVAL) if the local value and name of vertical river datum reference level (design waterlevel) is known.
- E) EUR: If the ISRS Location Code is available, it has to be encoded (see 2.4.13). If a MRN or RIS-ID is available, the attribute **interoperability identifier** must be encoded (refer to **Fehler! V erweisquelle konnte nicht gefunden werden.**)

7 Geo Features – Landmarks

7.1 Buildings, landmarks, tanks, silos: Common encoding combinations

In the following Table, the symbol '/' indicates that this attribute does not exist for that particular feature class. A blank indicates that the encoder may choose a relevant value for the attribute. The Table contains the most common examples of coding; other coding combinations are possible.

Feature	Feature class	function	category of landmark	product	category of silo/tank
Administrative	Building	18	/	/	/
Bank office	Building	13	/	/	/
Boundary mark	Landmark		23	/	/
Buddhist temple	Building	25	/	/	/
Bus station	Building	42	/	/	/
Cairn	Landmark	/	1	/	/
Cemetery	Landmark		2	/	/
Chapel	Building	21	/	/	/
Chimney	Landmark		3	/	
Church	Building	20	/	/	/
Church dome, Cupola	Landmark	20	15	/	/
Church spire	Landmark	20	20	/	/
Church tower	Landmark	20	17	/	/
Clock tower	Landmark	38	17	/	/
Column	Landmark	/	10	/	/
Communication mast	Landmark	29	7	/	/
Communication tower	Landmark	29	17	/	/
Control tower	Landmark	39	17	/	/
Cooling tower	Landmark	35	17	/	/
Cross, Calvary	Landmark		14	/	/
Customs office	Building	3	/	/	/
Dish aerial	Landmark		4	/	/
Dome or cupola, part of a building	Landmark		15	/	/
Educational facility	Building	19	/	/	/
Factory	Building	16	/	/	/
Flagstaff, Flagpole	Landmark		5	/	/

Feature	Feature class	function	category of landmark	product	category of silo/tank
Flare stack on land	Landmark		6	/	/
Grain elevator	Silo/Tank	/	/	22	3
Harbour-masters office	Building	2	/	/	/
Headquarters for district control	Building	14	/	/	/
Health office	Building	4	/	/	/
Hospital	Building	5	/	/	/
Hotel	Building	7	/	/	/
House, Building	Building		/	/	/
Large rock or boulder on land	Landmark	/	21	/	/
Light house (tower)	Landmark	33	17	/	/
Light house (other shapes)	Building	33	/	/	/
Lookout station in general	Building	28	/	/	/
Lookout tower	Landmark	28	17	/	/
Marabout	Building	27	/	/	/
Mast in general	Landmark		7	/	/
Memorial plaque	Landmark		11	/	/
Microwave tower	Landmark	34	17	/	/
Minaret	Landmark	26	20	/	/
Monument	Landmark		9	/	/
Mooring mast	Landmark	40	7	/	/
Mosque	Building	26	/	/	/
Obelisk	Landmark	/	12	/	/
Observation tower	Landmark	36	17	/	/
Observation wheel	Landmark	/	24	/	/
Pagoda	Building	23	/	/	/
Pilot lookout	Building	12	/	/	/
Pilot office	Building	11	/	/	/
Police station	Building	9	/	/	/
Post office	Building	6	/	/	/
Power station	Building	17	/	/	/
Radar dome	Landmark	32	15	/	/
Radar mast	Landmark	32	7	/	/
Radar scanner	Landmark		16	/	/

Feature	Feature class	function	category of landmark	product	category of silo/tank
Radar tower	Landmark	32	17	/	/
Radio mast	Landmark	31	7	/	/
Radio tower	Landmark	31	17	/	/
Railway station	Building	8	/	/	/
Shinto shrine	Building	24	/	/	/
Silo	Silo/Tank	/	/		1
Spire, part of a building	Landmark		20	/	/
Stadium	Building	41	/	/	/
Statue	Landmark		13	/	/
Tank	Silo/Tank	/	/		2
Television mast	Landmark	30	7	/	/
Television tower	Landmark	30	17	/	/
Temple	Building	22	/	/	/
Timeball tower	Landmark	37	17	/	/
Torii	Landmark	/	25	/	/
Tower	Landmark		17	/	/
Tower, part of a building	Landmark		17	/	/
Transit shed, Warehouse	Building	15	/	/	/
Triangulation mark	Landmark		22	/	/
Water tower	Silo/Tank	/	/	3 or 8	4
Water-police station	Building	10	/	/	/
Windmill	Landmark		18	/	/
Windmotor	Wind Turbine	/	/	/	/

Table 7-1 – Buildings, landmarks, tanks and silos – Encoding**Remarks:**

- If it is required to encode an offshore landmark (as defined by the attribute **category of landmark**), the Inland ECDIS or ECS system attribute **in the water** (see clause 30.2) must be populated to ensure the feature is always displayed on the Inland ECDIS or ECS. Where fitted, lights should be encoded as described in Section 19, with the **Building**, **Wind Turbine**, **Landmark** or **Silo/Tank** being used as the structure feature for the relevant light equipment feature(s) (see clause 18.1).
- For encoding wind turbines, see clause 7.4.

7.2 Landmark

IHO Definition: **LANDMARK.** Any prominent object at a fixed location on land which can be used in determining a location or a direction. (IHO Dictionary – S-32).

S-401 Geo Feature: Landmark (LNDMRK) (O)

Primitives: Point, Curve, Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
				
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of landmark	(CATLMK)	1 : cairn 2 : cemetery 3 : chimney 4 : dish aerial 5 : flagstaff 6 : flare stack 7 : mast 8 : windsock 9 : monument 10 : column/pillar 11 : memorial plaque 12 : obelisk 13 : statue 14 : cross 15 : dome 16 : radar scanner 17 : tower 18 : windmill 20 : spire/minaret 21 : large rock or boulder on land 22 : triangulation mark 23 : boundary mark 24 : observation wheel 25 : torii 26 : bridge 27 : dam	EN	1,*
category of special purpose mark	(CATSPM)	16 : leading mark 17 : measured distance mark 41 : clearing mark	EN	0,*

colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,* (ordered)
<i>colour pattern</i>	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1 †
condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 4 : wingless 5 : planned construction	EN	0,1
<i>elevation</i>	(ELEVAT)		RE	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
function	(FUNCTN)	2 : harbour-masters office 3 : customs office 4 : health office 5 : hospital 6 : post office 7 : hotel 8 : railway station 9 : police station 10 : water-police station 11 : pilot office 12 : pilot lookout 13 : bank office 14 : headquarters for district control 15 : transit shed/warehouse 16 : factory 17 : power station 18 : administrative 19 : educational facility 20 : church 21 : chapel 22 : temple 23 : pagoda 24 : Shinto shrine 25 : Buddhist temple 26 : mosque 27 : marabout 28 : lookout	EN	0,*

		29 : communication 30 : television 31 : radio 32 : radar 33 : light support 34 : microwave 35 : cooling 36 : observation 37 : timeball 38 : clock 39 : control 40 : airship mooring 41 : stadium 42 : bus station 44 : sea rescue control 45 : observatory 46 : ore crusher 47 : boathouse 48 : pumping station		
<i>height</i>	(HEIGHT)		RE	0,1
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>multiplicity of features</i>			C	0,1
<i>multiplicity known</i>			(S) BO	1,1
<i>number of features</i>			(S) IN	0,1
<i>nature of construction</i>	(NATCON)	1 : masonry 2 : concreted 3 : loose boulders 6 : wooden 7 : metal 8 : glass reinforced plastic 11 : latticed 12 : glass	EN	0,*
<i>radar conspicuous</i>	(CONRAD)		BO	0,1
<i>reported date</i>	(SORDAT)	See clause 2.4.8	TD	0,1
<i>status</i>	(STATUS)	2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 12 : illuminated 13 : historic 14 : public	EN	0,*
<i>vertical length</i>	(VERLEN)	[xxx.x], e.g. 21.7	RE	0,1
<i>visual prominence</i>	(CONVIS)	1 : visually conspicuous 2 : not visually conspicuous 3 : prominent	EN	1,1
<i>scale minimum</i>	(SCAMIN)	[EUR: 45000; US: 60000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
<i>file locator</i>			(S) TE	0,1
<i>file reference</i>	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
<i>headline</i>			(S) TE	0,1
<i>language</i>		ISO 639-2/T	(S) TE	1,1

text	(INFORM) (NINFOM)		(S) TE	0,1 †
pictorial representation	(PICREP)	See clause 2.4.12.2	TE	0,1
in the water			BO	0,1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 †
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity

The Structure	Structure/Equipment (see clause 25.12)	Bollard, Daymark, Distance Mark, Fog Signal, Helipad, Light Air Obstruction, Light All Around, Light Sectored, Notice Mark, Physical AIS Aid to Navigation, Radar Transponder Beacon, Signal Station Traffic, Signal Station Warning	Composition	0,1
The Component	Aids to Navigation Association (see clause 25.2)	Fairway System, Traffic Separation Scheme, Two-Way Route	Association	0,*
The Auxiliary Feature	Fairway Auxiliary (see clause 25.6)	Fairway	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
	Additional Information (see clause 25.1)	Contact Details, NonStandard Working Day, Service Hours, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] The attribute **colour pattern** is mandatory for landmarks that have more than one value populated for the attribute **colour**.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

7.2.1 Buildings, landmarks, tanks, silos

Depending on height and the topographic relief, structures considered to be landmarks should be encoded up to several kilometres inland.

Waterfront, landmark and some public buildings should be encoded precisely and individually on the larger optimum display scale IENC data. When representing buildings generally, including urban and other built-up areas, the aim of the compiler must be to create the correct impression of the extent of the built-up area and the density of the buildings.

If it is required to encode a landmark (other than a tank, silo or roofed structure erected or extending over navigable water), it must be done using the feature **Landmark**.

Remarks:

- For buildings, see clause 6.2; for silos, tanks and water towers, see clause 7.3. For common encoding combinations, see clause 7.1. For wind turbines, see clause 7.4. For roofed structures such as boathouses erected or extending over navigable water to provide protection for a vessel or its cargo, see clause 8.7. For flare stacks on offshore platforms, see clause 14.1.1.
- The feature association **Structure/Equipment** (see clause 25.12) must only be used with **Landmark** features if the main purpose of the structure is to act as an aid to navigation (for example a lighthouse).
- A water tower must be encoded, where required, using the feature **Silo/Tank** (see clause 7.3).
- A ruined landmark should be encoded in the same way as the feature in good condition, but with attribute **condition = 2** (ruined).

- Radio and television masts and towers are likely to be visible over long distances and should be encoded as landmarks, even when well inland. They will usually carry air obstruction lights.
- To aid identification of landmarks by the boatmaster it may be useful to add the height of the top of the structure above ground level (**vertical length**) or above the general height datum (**height**).
- Buildings constructed as places of worship often form significant landmarks; their size and structure incorporating towers, spires, cupolas, etc often render them conspicuous. These buildings when known to be prominent or conspicuous should be encoded up to several miles inland (see Figure 7-1 below, examples (a) and (b)).
- The attribute **category of special purpose mark** should only be used if the **Landmark** is used as the front or rear lead for a transit, clearing line or measured distance, or for a leading line. Values for **category of special purpose mark** such as 16 (leading mark), 17 (measured distance mark) or 41 (clearing mark) in particular should be used for these purposes.
- Values **category of landmark** = 26 (bridge) and 27 (dam) must only be used if the feature is encoded using point geometry; and must not be encoded over navigable water. Bridges and dams encoded using curve or surface geometry must be encoded using features **Bridge** (see clause 6.6) and **Dam** (see clause 8.12) respectively.
- For landmarks located in navigable water, the Boolean attribute **in the water** must be set to *True* to indicate that the feature is to be included in the Inland ECDIS or ECS Base Display. Where such structures are located in the water it is not required to encode any supporting structures (for example piles).
- When a building is shown as a surface, indicating its true shape, and it is required to encode a prominent feature such as a tower or spire that is part of the structure, two features must be created (see Figure 7-1 (b) below):
 - a **Building** feature of type surface for the main building,
 - a **Landmark** feature of type point for the prominent feature

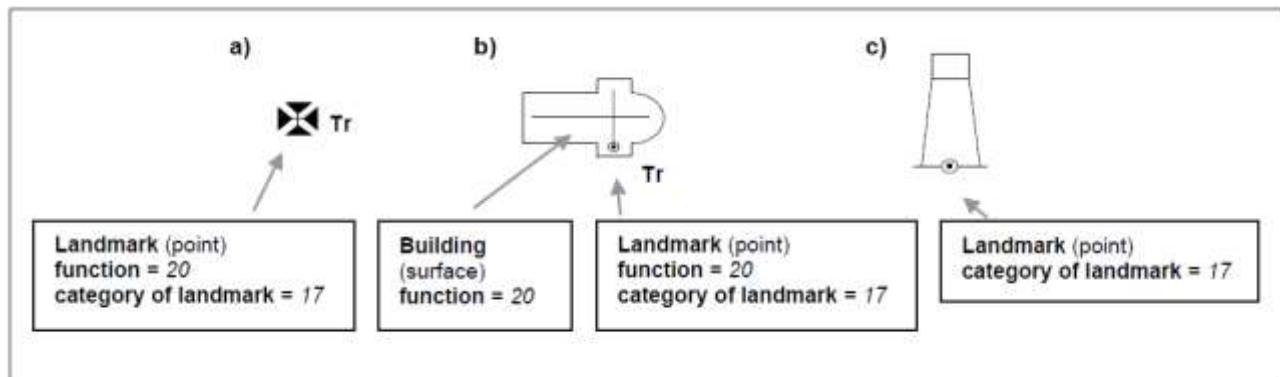


Figure 7-1 – Landmarks

- Not all landmarks are visually conspicuous. If a feature is visually conspicuous (that is, it is distinctly and noticeably visible from seaward), the attribute **visual prominence** must be encoded

Distinction: Building; Daymark; Exceptional Navigational Structure, Pylon/Bridge Support; Silo/Tank; Special Purpose/General Beacon; Structure Over Navigable Water, Terminal, Wind Turbine.

Inland specific Encoding Instructions:

- Buildings that are visible from the water and that may be used as landmarks shall be collected as **Landmark** (LNDMRK) if possible. Only visually conspicuous landmarks shall be encoded as landmarks. As a result the mandatory attribute CONVIS shall always be 1 (visually conspicuous).
- If the landmark serves as a navigational light support, FUNCTN = 33 (light support), it must be encoded with a **LIGHTS** feature (see 19).

- C) Overhead pipelines and cables may have significant towers that should be captured as “tower” [Landmark (LNDMRK) / **category of landmark** (CATLMK) = 17 (tower)].

7.3 Silo/tank

IHO Definition: **SILO/TANK.** A large storage structure used for storing loose materials, liquids and/or gases. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2012).

S-401 Geo Feature: Silo/Tank (SILTNK) (O)

Primitives: Point, Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
				
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
<i>building shape</i>	(BUISHP)	5 : high-rise building 6 : pyramid 7 : cylindrical 8 : spherical 9 : cubic	EN	0,1
<i>category of silo/tank</i>	(CATSIL)	1 : silo in general 2 : tank in general 3 : grain elevator 4 : water tower	EN	0,1
<i>colour</i>	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,* (ordered)
<i>colour pattern</i>	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1 [†]
<i>condition</i>	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
<i>elevation</i>	(ELEVAT)		RE	0,1
<i>feature name</i>		See clause 2.5.8	C	0,*
<i>language</i>		ISO 639-2/T	(S) TE	1,1

<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
<i>height</i>	(HEIGHT)		RE	0,1
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>multiplicity of features</i>			C	0,1
<i>multiplicity known</i>			(S) BO	1,1
<i>number of features</i>			(S) IN	0,1
<i>nature of construction</i>	(NATCON)	1 : masonry 2 : concreted 6 : wooden 7 : metal 8 : glass reinforced plastic	EN	0,*
<i>product</i>	(PRODCT)	1 : oil 2 : gas 3 : water 5 : coal 7 : chemicals 8 : drinking water 9 : milk 13 : salt 14 : sand 16 : sawdust/wood chips 18 : liquefied natural gas 19 : liquefied petroleum gas 20 : wine 21 : cement 22 : grain 24 : ice	EN	0,*
<i>radar conspicuous</i>	(CONRAD)		BO	0,1
<i>reported date</i>	(SORDAT)	See clause 2.4.8	TD	0,1
<i>status</i>	(STATUS)	4 : not in use 12 : illuminated 13 : historic	EN	0,*
<i>vertical length</i>	(VERLEN)		RE	0,1
<i>visual prominence</i>	(CONVIS)	1 : visually conspicuous 2 : not visually conspicuous 3 : prominent	EN	0,1
<i>scale minimum</i>	(SCAMIN)	[EUR: 22000; US: 30000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
<i>file locator</i>			(S) TE	0,1
<i>file reference</i>	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
<i>headline</i>			(S) TE	0,1
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>text</i>	(INFORM) (NINFOM)		(S) TE	0,1 [†]
<i>pictorial representation</i>	(PICREP)	See clause 2.4.12.2	TE	0,1
<i>in the water</i>			BO	0,1

Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The structure	Structure/Equipment (see clause 25.12)	Daymark, Distance Mark, Fog Signal, Light All Around, Light Sectored, Notice Mark, Physical AIS Aid to Navigation, Radar Transponder Beacon, Signal Station Traffic, Signal Station Warning	Composition	0,1
The Component	Aids to Navigation Association (see clause 25.2)	Deep Water Route, Fairway System, Traffic Separation Scheme, Two-Way Route	Association	0,*

The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] The attribute **colour pattern** is mandatory for silos or tanks that have more than one value populated for the attribute **colour**.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

7.3.1 Tanks, silos

Isolated tanks or gasholders may be good landmarks and should be represented true to scale (that is, as surface) where possible, to enable them to be used as fixing marks. Groups of tanks, as at a refinery, may be useful for general identification of position but cannot usually be used for precise position-fixing because of uncertainty of the location of individual tanks.

If it is required to encode a tank or silo, it must be done using the feature **Silo/Tank**.

Remarks:

- For buildings, see clause 6.2; for landmarks, see clause 7.2. For common encoding combinations, see clause 7.1. For roofed structures such as boathouses erected or extending over navigable water to provide protection for a vessel or its cargo, see clause 8.7.
- Groups of silos or tanks (tank farm) in close proximity must be encoded, where required, using the feature **Production/Storage Area** (see clause 7.6). Individual, visually conspicuous silos, or tanks within a tank farm, may be encoded as **Silo/Tank** within the **Production/Storage Area**. Multiple silos contained within a single structure may be indicated using the complex attribute **multiplicity of features**.
- For tanks or silos located in or over navigable water, the Boolean attribute **in the water** must be set to *True* to indicate that the feature is to be included in the Inland ECDIS or ECS Base Display. Where such structures are located in the water it is not required to encode any supporting structures (for example piles).

Distinction: Building; Landmark; Production/Storage Area.

Inland specific Encoding Instructions:

- A) Outline silo or tank with circle, square, or rectangle.

7.4 Wind turbine

IHO Definition: **WIND TURBINE.** A tower and associated equipment that generates electrical power from wind. They can be sited offshore and may be either fixed or floating. (IHO Dictionary – S-32).

S-401 Geo Feature: Wind Turbine (*LNDMRK (CATLMK = 19)*) (O)

Primitives: Point

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
<i>colour</i>	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,* (ordered)
<i>colour pattern</i>	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1 [†]
<i>condition</i>	(CONDTN)	1 : under construction 2 : Ruined 3 : Under Reclamation 4 : wingless 5 : planned construction	EN	0,1
<i>elevation</i>	(ELEVAT)		RE	0,1
<i>feature name</i>		See clause 2.5.8	C	0,*
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
<i>fixed date range</i>		See clause 2.4.8	C	0,1
<i>date end</i>	(DATEND)		(S) TD	0,1 [†]
<i>date start</i>	(DATSTA)		(S) TD	0,1 [†]
<i>height</i>	(HEIGHT)		RE	0,1
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>multiplicity of features</i>			C	0,1

multiplicity known			(S) BO	1,1
number of features			(S) IN	0,1
<i>nature of construction</i>	(NATCON)	2 : concreted 6 : wooden 7 : metal 8 : glass reinforced plastic 11 : latticed	EN	0,*
<i>radar conspicuous</i>	(CONRAD)		BO	0,1
reported date	(SORDAT)	See clause 2.4.8	TD	0,1
<i>status</i>	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 12 : illuminated 13 : historic 14 : public 28 : buoyed	EN	0,*
vertical clearance fixed			C	0,1
vertical clearance value	(VERCLR)		(S) RE	1,1
vertical uncertainty	(VERACC)		(S) RE	0,1
uncertainty fixed			(S) RE	1,1
uncertainty variable factor			(S) RE	0,1
vertical datum	(VERDAT)	3 : mean sea level 10 : Approximate Lowest Astronomical Tide 12 : Mean Lower Low Water 13 : low water 16 : mean high water 17 : mean high water springs 18 : high water 19 : approximate mean sea level 20 : high water springs 21 : mean higher high water 23 : Lowest Astronomical Tide 24 : local datum 25 : international great lakes datum 1985 26 : mean water level 28 : higher high water large tide 29 : nearly highest high water 30 : highest astronomical tide 31 : Local Low Water Reference Level 32 : Local High Water Reference Level 33 : Local Mean Water Reference Level 34 : Equivalent Height of Water (German GIW)	EN	0,1

		35 : Highest Shipping Height of Water (German HSW) 36 : Reference Low Water Level According to Danube Commission 37 : Highest Shipping Height of Water According to Danube Commission 38 : Dutch River Low Water Reference Level (OLR) 39 : Russian Project Water Level 40 : Russian Normal Backwater Level 41 : Ohio River Datum 43 : Dutch High Water Reference Level 44 : baltic sea chart datum 2000 45 : Dutch Estuary Low Water Reference Level (OLW)		
vertical length	(VERLEN)		RE	0,1
visual prominence	(CONVIS)	1 : visually conspicuous 2 : not visually conspicuous 3 : prominent	EN	0,1
water level effect	(WATLEV)	2 : always dry 7 : floating	EN	0,1
scale minimum	(SCAMIN)	[EUR: 45000; US: 60000] or see clause 2.5.9	IN	1,1
<i>information</i>	(INFORM)	See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
pictorial representation	(PICREP)	See clause 2.4.12.2	TE	0,1
in the water			BO	0,1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime	(S) EN	0, 1

		16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0, *
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Structure	Structure/Equipment (see clause 25.12)	Daymark, Distance Mark, Fog Signal, Light Air Obstruction, Light All Around, Light Sectored, Notice Mark, Physical AIS Aid to Navigation, Radar Transponder Beacon, Signal Station Traffic, Signal Station Warning	Composition	0,1
The Component	Aids to Navigation Association (see clause 25.2)	Fairway System, Traffic Separation Scheme, Two-Way Route	Association	0, *
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0, *
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0, *
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0, *

[†] The attribute **colour pattern** is mandatory for bridges that have more than one value populated for the attribute **colour**.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

7.4.1 Wind turbines

Wind turbines are generally tall, multi-bladed structures, usually with two or three blades, which may pose as obstacles to navigation if located offshore but are often visible over long distances and therefore useful as visual references. Their purpose is to generate electricity for large communities, or to feed a national grid. They are often in groups (known as wind farms). Floating wind turbines are held in position by ground tackle and consequently may be subject to significant lateral and some vertical movement.

If it is required to encode a wind turbine, it must be done using the feature **Wind Turbine**.

Remarks:

- The attribute **elevation** is only applicable for wind turbines on land.
- To aid identification of wind turbines on land by the boatmaster it may be useful to add the height of the top of the structure above ground level (**vertical length**) or above the general height datum (**height**).
- For offshore wind turbines, the Boolean attribute **in the water** must be set to *True* to indicate that the feature is to be included in the Inland ECDIS or ECS Base Display. Where such structures are located in the water it is not required to encode any supporting structures (for example piles).
- For offshore wind turbines (attribute **in the water** = *True*), the attribute **height** is only relevant for fixed turbines, and is referred to the vertical datum (see clause 2.5.7).
- For offshore wind turbines, the attribute **vertical length** is only relevant for floating wind turbines, and is referred to the sea level.
- A ruined wind turbine should be encoded in the same way as the feature in good condition, but with attribute **condition** = 4 (wingless).
- If it is required to encode sites of dismantled offshore wind turbines, this must be done using **Foul Ground** features (see clause 13.7), unless the source indicates that any remaining structure protrudes far enough above the seabed so as to be an obstruction to surface navigation, in which case this must be encoded using an **Obstruction** feature (see clause 13.6).
- If it is required to encode an offshore wind farm, it must be done using the feature **Offshore Production Area** (see clause 14.6). An onshore wind farm must be encoded, where required, using the feature **Production/Storage Area** (see clause 7.6).
- Wind turbines may carry lights (see Section 19) or fog signals (see clause 20.16). Where fitted, lights should be encoded as described in Section 19, with the **Wind Turbine** being used as the structure feature for the light equipment feature(s).
- Value 13 (low water) for attribute **vertical datum** is only applicable to enclosed (inland) waterways; and must not be used to indicate the reference datum for vertical clearances in tidal waters.
- If available and considered important for route planning and/or monitoring, the vertical uncertainty associated with encoded vertical clearance values should also be encoded.
- For encoding offshore safety zones around offshore wind turbines, see clause 14.1.3.

Distinction: Building; Daymark; Landmark; Offshore Platform; Offshore Production Area; Pylon/Bridge Support; Silo/Tank; Special Purpose/General Beacon.

Inland specific Encoding Instructions:

- A) Only visually conspicuous wind turbines shall be encoded as **Wind Turbines**. As a result the mandatory attribute **visual prominence** (CONVIS) shall always be 1 (visually conspicuous).

7.5 Fortified structure

IHO Definition: **FORTIFIED STRUCTURE**. A structure that is specifically designed or reinforced to provide for defence from armed attack. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

S-401 Geo Feature: Fortified Structure (FORSTC) (O)

Primitives: Point, Curve, Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of fortified structure	(CATFOR)	1 : castle 2 : fort 3 : battery 4 : blockhouse 5 : fortified tower 6 : redoubt 8 : fortified submarine shelter 9 : rampart	EN	1,1
condition	(CONDTN)	1 : under construction 2 : ruined	EN	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
height	(HEIGHT)		RE	0,1
interoperability identifier		MRN (see clause 27.161)	URN	0,1
nature of construction	(NATCON)	1 : masonry 2 : concreted 3 : loose boulders 6 : wooden 7 : metal	EN	0,*
radar conspicuous	(CONRAD)		BO	0,1
reported date	(SORDAT)	See clause 2.4.8	TD	0,1
status	(STATUS)	4 : not in use 7 : temporary 8 : private 12 : illuminated 13 : historic 14 : public 28 : buoyed	EN	0,*
vertical length	(VERLEN)		RE	0,1

visual prominence	(CONVIS)	1 : visually conspicuous 2 : not visually conspicuous 3 : prominent	EN	0,1
scale minimum	(SCAMIN)	[22000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
pictorial representation	(PICREP)	See clause 2.4.12.2	TE	0,1
in the water			BO	0,1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1

name usage			1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
Feature Associations					
S-401 Role	Association Type	Associated to	Type	Multiplicity	
The Structure	Structure/Equipment (see clause 25.12)	Bollard, Daymark, Distance Mark, Fog Signal, Light All Around, Light Sectored, Notice Mark, Physical AIS Aid to Navigation, Radar Transponder Beacon, Signal Station Traffic, Signal Station Warning	Composition	0,1	
The Component	Aids to Navigation Association (see clause 25.2)	Fairway System, Traffic Separation Scheme, Two-Way Route	Association	0,*	
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*	
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1	
	Additional Information (see clause 25.1)	Nautical Information	Association	0,*	
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*	

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

7.5.1 Fortified structures

Some shorelines have prominent defensive structures, often disused, decayed, or used for non-defence purposes. Such structures range from major castles and forts to minor lookout posts and may be the main distinctive features of headlands or stretches of coastline. National regulations permitting, any such features as are likely to be visible from seaward and should be encoded on the largest optimum display scale IENC data.

If it is required to encode a fortified structure, it must be done using the feature **Fortified Structure**.

Remarks:

- If it is required to encode a Martello tower, it must be done using **Fortified Structure** with attribute **category of fort** = 5 (fortified tower).
- Where fitted, lights should be encoded as described in Section 19, with the **Fortified Structure** being used as the structure feature for the relevant light equipment feature(s) (see clause 18.1).
- For fortified structures located in navigable water, the Boolean attribute **in the water** must be set to *True* to indicate that the feature is to be included in the Inland ECDIS or ECS Base Display. Where such structures are located in the water it is not required to encode any supporting structures (for example piles).

Distinction: Building; Fence/Wall; Landmark.

Inland specific Encoding Instructions:

- A) Fortified structures shall be encoded as **Fortified Structures** (FORSTC), if they can be seen from the water.

7.6 Production/storage area

IHO Definition: **PRODUCTION/STORAGE AREA.** An area on land for the exploitation or storage of natural resources. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.124, November 2000).

S-401 Geo Feature: Production/Storage Area (PRDARE) (O)

Primitives: Point, Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
				
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of production area	(CATPRA)	1 : quarry 2 : mine 3 : stockpile 4 : power station area 5 : refinery area 6 : timber yard 7 : factory area 8 : tank farm 9 : wind farm 10: slag heap/spoil heap 11 : production plant 12 : solar farm	EN	0,1
condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
<i>elevation</i>	(ELEVAT)		RE	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
<i>fixed date range</i>		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
<i>height</i>	(HEIGHT)		RE	0,1
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1

product	(PRODCT)	1 : oil 2 : gas 3 : water 4 : stone 5 : coal 6 : ore 7 : chemicals 8 : drinking water 9 : milk 10 : bauxite 11 : coke 12 : iron ingots 13 : salt 14 : sand 15 : timber 16 : sawdust/wood chips 17 : scrap metal 18 : liquefied natural gas 19 : liquefied petroleum gas 20 : wine 21 : cement 22 : grain 23 : electricity 25 : clay	EN	0,*
<i>radar conspicuous</i>	(CONRAD)		BO	0,1
reported date	(SORDAT)	See clause 2.4.8	TD	0,1
status	(STATUS)	2 : occasional 4 : not in use 12 : illuminated 16 : watched 17 : un-watched	EN	0,*
<i>vertical length</i>	(VERLEN)		RE	0,1
visual prominence	(CONVIS)	1 : visually conspicuous 2 : not visually conspicuous 3 : prominent	EN	0,1
scale minimum	(SCAMIN)	[12000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
pictorial representation	(PICREP)	See clause 2.4.12.2	TE	0,1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural	(S) EN	0, 1

		9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0, *
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
	Additional Information (see clause 25.1)	Contact Details, NonStandard Working Day, Service Hours, Nautical Information	Association	0, *
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0, *

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

7.6.1 Production and storage areas

Production or storage areas located in close proximity to the coast are often prominent landmarks used by boatmasters to assist in position-fixing. Features such as quarry faces, stockpiles, power stations, refineries, timber stacks in timber yards, factories, groups of tanks, groups of wind turbines, and slag heaps should be shown on the largest optimum display scale IENC data.

If it is required to encode production or storage area, it must be done using the feature **Production/Storage Area**.

Remarks:

- If there are individual buildings or equipment features contained within this area, they should be encoded as separate features such as **Building**, **Crane**, **Landmark** or **Silo/Tank** within the **Production/Storage Area** feature of type surface if the optimum display scale of the IENC data permits.
- If visible from seaward, a quarry face should be encoded as for a cliff (see clause 5.1), with attribute **category of slope = 6** (cliff).

Distinction: Free Port Area; Offshore Production Area.

Inland specific Encoding Instructions:

- A) Only production and storage areas that are connected to transhipment installations and areas that are visually conspicuous should be encoded.
- B) If a structured external XML-file with more detailed communication information is available, the reference to the file has to be entered in the **file reference** (TXTDSC) attribute.

8 Geo Features – Ports

8.1 Works in progress and projected

An IENC can seldom show the exact state of work under construction because it may not be known by the encoder and, even if known, may be expected to change between IENC updates (see Section 31). Where it is possible to provide the boatmaster with an indication of the status of work under construction, under reclamation or planned, it must be done using the appropriate feature (for example **Shoreline Construction**, **Causeway**, **Dock Area**, **Dry Dock**, **Pipeline Submarine/On Land**), with the attribute **condition** populated as 1 (under construction), 3 (under reclamation) or 5 (planned construction). Where the encoder wishes to provide such information to the boatmaster and the details of the works are not known (nature and extent of the works), this should be done using the feature **Caution Area** (see clause 16.11), with known details of the works encoded using the complex attribute **information** (see clause 2.4.6).

If it is required to provide the boatmaster with an indication of the date to which information regarding the works is current, it must be done using the attribute **reported date** (see clause 27.216).

The coastline existing before the beginning of the works should remain encoded as a **Coastline** or **Shoreline Construction** feature until the completion of the works.

As the works progress and further information is supplied to the producer, IENC datasets should be updated appropriately through the issue of updates to the dataset or publication of New Editions of the dataset (see clause 31.2.3).

On completion of the works, full encoding of the new feature(s) in accordance with the relevant clauses in this document must be achieved, and incorporated in the relevant IENC dataset through the issue of an update to the dataset or publication of a New Edition of the dataset (see Section 31).

8.1.1 Works on land

Features likely to be prominent from seaward should be encoded as described above, where possible. New docks, locks, canals, etc, being excavated should be encoded similarly. The works must be covered by the feature **Land Area** (see clause 5.4) until completion of the works.

8.1.2 Works at sea

Works in the water which will extend the shoreline into the water, where the line of the future shoreline (including piers, etc) is known, must be encoded, where required, as described in clause 8.1 above, using the appropriate features. The existing coastline should remain until the works are completed and the new coastline has been established. The area of reclamation or construction must also be covered by the appropriate feature(s) from the Skin of the Earth. This may be **Depth Area** at commencement of the works, or if the works are planned and have not yet commenced; **Unsurveyed Area** while reclamation/construction is in progress but the area is still covered by water; or **Land Area** where the area of the works has been reclaimed (that is, is always dry).

Works in the water which will be wholly or partly submerged when completed, such as training walls or pipelines must be encoded, if required, using the appropriate feature relevant to the completed feature, in accordance with clause 8.1 above. The appropriately attributed depth information, if known, or **Unsurveyed Area**, must cover the works as appropriate.

Where the extent or nature of the works is unknown, they must be encoded, where required, using the feature **Caution Area** as described in clause 8.1 above.

Because lights and buoys marking the limits of works in the water may be moved without notice, they should be encoded only where it is considered safe to do so. Alternatively, this information may be included by encoding the complex attribute **information**, sub-attribute **text**, for instance, *Outer end marked by red lights*.

8.2 Checkpoint

IHO Definition: **CHECKPOINT**. An official location at which to register, declare and/or inspect goods and/or people. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

S-401 Geo Feature: Checkpoint (chkpnt) (C)

Primitives: Point, Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of checkpoint	(CATCHP)	1 : custom 2 : border	EN	1,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
interoperability identifier		MRN (see clause 27.161)	URN	0,1
status	(STATUS)	1 : permanent 2 : occasional 5 : periodic/intermittent 7 : temporary 9 : mandatory 12 : illuminated	EN	0,*
scale minimum	(SCAMIN)	[EUR: 12000; US: 22000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFOM)		(S) TE	0,1 [†]
Nationality	(NATION)		TE	1, 1
UN Location Code	(unlocd)		TE	0, 1
Pictorial Representation	(PICREP)		TE	0, 1
Reported Date	(SORDAT)		TD	0, 1

Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0, *
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0, *
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
	Additional Information (see clause 25.1)	Contact Details, NonStandard Working Day, Service Hours, Nautical Information, Time Schedule In General	Association	0, *

-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*
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[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

8.2.1 Checkpoints

If it is required to encode an official place to register, declare and/or check goods and people, it must be done using the feature **Checkpoint**.

Remarks:

- The **Checkpoint** must only be used to encode the function. In addition, if it is required to encode a physical feature (for example building, fence, gate), it must be done using an appropriate feature (for example **Building**, **Landmark**).

Distinction: Custom Zone.

Inland specific Encoding Instructions:

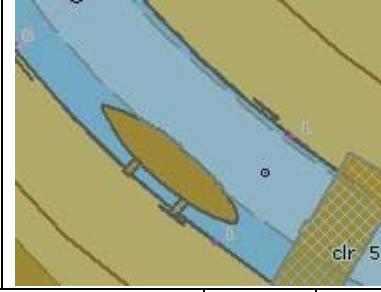
- A) If a structured external XML-file with more detailed communication information is available, the reference to the file has to be entered in the **file reference** (TXTDSC) attribute.
- B) If an UNLOCODE or an ISRS is available, it must be encoded (see 2.4.13). If a MRN or a RIS-ID is available, the attribute **interoperability identifier** must be encoded (refer to **Fehler! V erweisquelle konnte nicht gefunden werden.**).
- C) EUR: At least mandatory check points must be encoded.

8.3 Hulk

IHO Definition: **HULK.** The hull of a wrecked or condemned ship, from which the fittings and superstructure have usually been removed, which is moored in a permanent position or grounded. It may be abandoned or put to some other use. (Adapted from IHO Dictionary – S-32).

S-401 Geo Feature: Hulk (HULKES, hulkes) (C)

Primitives: Point, Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
				
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of hulk	(CATHLK)	1 : floating restaurant 2 : historic ship 3 : floating museum 4 : floating accommodation 5 : floating breakwater 6 : casino 7 : training vessel	EN	1,*
colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,* (ordered)
colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1 [†]
condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1

<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
<i>fixed date range</i>		See clause 2.4.8	C	0,1
<i>date end</i>	(DATEND)		(S) TD	0,1 [†]
<i>date start</i>	(DATSTA)		(S) TD	0,1 [†]
<i>horizontal length</i>	(HORLEN)		RE	0,1
<i>horizontal width</i>	(HORWID)		RE	0,1
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>periodic date range</i>		See clause 2.4.8	C	0,*
<i>date end</i>	(PEREND)		(S) TD	1,1
<i>date start</i>	(PERSTA)		(S) TD	1,1
<i>radar conspicuous</i>	(CONRAD)		BO	0,1
<i>reported date</i>	(SORDAT)	See clause 2.4.8	TD	0,1
<i>vertical length</i>	(VERLEN)		RE	0,1
<i>visual prominence</i>	(CONVIS)	1 : visually conspicuous 2 : not visually conspicuous 3 : prominent	EN	0,1
<i>scale minimum</i>	(SCAMIN)	[EUR: 22000; US: 30000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
<i>file locator</i>			(S) TE	0,1
<i>file reference</i>	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
<i>headline</i>			(S) TE	1,1
<i>language</i>		ISO 639-2/T	(S) TE	0,1
<i>text</i>	(INFORM) (NINFORM)		(S) TE	0,1 [†]
<i>pictorial representation</i>	(PICREP)	See clause 2.4.12.2	TE	0,1
UN Location Code	(unlocd)		TE	0, 1
Horizontal Distance Uncertainty	(HORACC)	[xx.xx] (metres), e.g., 1.54	RE	0, 1
Vertical Uncertainty	(VERACC)		C	0, 1
Uncertainty Fixed	(POSACC) (SOUACC) (VERACC)	[xx.xx] (metres), e.g., 1.54	(S) RE	1, 1
Uncertainty Variable Factor			(S) RE	0, 1
Category of Temporal Variation	(CATTEV)	4 : Likely to Change 5 : Unlikely to Change 6 : Unassessed	EN	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration	(S) EN	0, 1

		6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0, *
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Structure	Structure/Equipment (see clause 25.12)	Bollard, Daymark, Distance Mark, Fog Signal, Light All Around, Notice Mark, Physical AIS Aid to Navigation, Radar Transponder Beacon, Signal Station Traffic, Signal Station Warning	Composition	0,1
The Component	Aids to Navigation Association (see clause 25.2)	Fairway System, Traffic Separation Scheme, TwoWay Route	Association	0, *
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0, *
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
	Additional Information (see clause 25.1)	Nautical Information	Association	0, *

-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*
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[†] The attribute **colour pattern** is mandatory for hulks that have more than one value populated for the attribute **colour**.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

8.3.1 Hulks

If it is required to encode a permanently moored ship, it must be done using the feature **Hulk**.

Remarks:

- A **Hulk** feature of type surface must not be bound by curve features **Coastline** or **Shoreline Construction**, unless the edge associated with the curve feature is also the boundary of a **Land Area** feature of type surface.
- If it is required to encode a floating production, storage and off-loading vessel, it must be done using the feature **Offshore Platform** (see clause 14.1), with attribute **category of offshore platform** = 8 (floating production, storage and off-loading vessel).
- If it is required to encode a hulk serving the purpose of a floating breakwater, it must be done using a **Hulk** feature, with attribute **category of hulk** = 5 (floating breakwater). If it is required to encode a floating breakwater of any other construction, it must be done using the feature **Shoreline Construction** (see clause 0), with attributes **category of shoreline construction** = 1 (breakwater) and **water level effect** = 7 (floating).

Distinction: Offshore Platform; Shoreline Construction; Wreck.

Inland specific Encoding Instructions:

- A) Place shape in location, orientation, and dimensions of the real world object.
- B) If the vessel or facility has a special time schedule or special operating hours apply, the feature can be combined with a time schedule. For this purpose refer to the **Time Schedule – In General** feature (tisdge) 24.6.
- C) If a structured external XML-file with more detailed communication information is available, the reference to the file has to be entered in the **file reference** (TXTDSC) attribute.
- D) If the ISRS Location Code is available it has to be encoded (refer to 2.4.13). If a MRN or a RIS-ID is available, the attribute **interoperability identifier** must be encoded (refer to **Fehler! V erweisquelle konnte nicht gefunden werden.**).
- E) Permanently moored vessels or facilities that are located in navigable water must be encoded.

8.4 Pile

IHO Definition: **PILE.** A long heavy timber or section of steel, wood, concrete, etc., forced into the earth or seafloor to serve as a support, as for a pier, or to resist lateral pressure; or as a free standing pole within a marine environment. (IHO Dictionary – S-32).

S-401 Geo Feature: Pile (PILPNT) (C)

Primitives: Point, Curve, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of pile	(CATPLE)	1 : stake 3 : post 4 : tripodal 5 : piling 6 : area of piles 7 : pipe 8 : mooring post	EN	0,1
colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,* (ordered)
colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1 †
condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1

name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
<i>fixed date range</i>		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
<i>height</i>	(HEIGHT)		RE	0,1
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>radar conspicuous</i>	(CONRAD)		BO	0,1
reported date	(SORDAT)	See clause 2.4.8	TD	0,1
<i>status</i>	(STATUS)	1 : permanent 4 : not in use 6 : reserved 7 : temporary 8 : private 12 : illuminated 14 : public	EN	0,*
vertical length	(VERLEN)	[xxx.x], e.g. 21.7	RE	0,1
<i>visual prominence</i>	(CONVIS)	1 : visually conspicuous 2 : not visually conspicuous 3 : prominent	EN	0,1
scale minimum	(SCAMIN)	[EUR: 22000; US: 30000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
pictorial representation	(PICREP)	See clause 2.4.12.2	TE	0,1
Vertical Uncertainty	(VERACC)		C	0, 1
Uncertainty Fixed	(POSACC) (SOUACC) (VERACC)	[xx.xx] (metres), e.g., 1.54	(S) RE	1, 1
Uncertainty Variable Factor			(S) RE	0, 1
Category of Temporal Variation	(CATTEV)	4 : Likely to Change 5 : Unlikely to Change 6 : Unassessed	EN	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port	(S) EN	0, 1

		5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0, *
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Structure	Structure/Equipment (see clause 25.12)	Bollard, Daymark, Distance Mark, Fog Signal, Light All Around, Light Sectored, Notice Mark, Physical AIS Aid to Navigation, Radar Transponder Beacon, Signal Station Traffic, Signal Station Warning	Composition	0,1
The Component	Aids to Navigation Association (see clause 25.2)	Fairway System, Traffic Separation Scheme, Two-Way Route	Association	0, *
The Component	Anchorage Or Berth Aggregation (see clause 25.18)	Anchorage Area, Anchor Berth, Berth, Mooring Area	Association	0, *
The Auxiliary Feature	Fairway Auxiliary (see clause 25.6)	Fairway	Association	0, *
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0, *

The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] The attribute **colour pattern** is mandatory for piles that have more than one value populated for the attribute **colour**.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

8.4.1 Piles

If it is required to encode a pile or post that is not used as a dolphin or an aid to navigation, it must be done using the feature **Pile**.

Remarks:

- Stumps of piles or posts that are dangerous to navigation must be encoded, where required, using **Obstruction** features (see clause 13.6), with attribute **category of obstruction** = 1 (snag/stump), and must not be encoded using **Pile**.
- **Pile** of type curve must only be used for **Pile** having **category of pile** = 5 (piling), which is sometimes termed “row of piles” or “sheet piling”. Point primitive may be used to encode piling for smaller optimum display scale IENC data.
- Stakes and posts that are identified on the source to serve the purpose of aids to navigation must be encoded, where required, using the appropriate beacon feature (for example **Special Purpose/General Beacon**), with attribute **beacon shape** = 1 (stake, pole, perch, post).

Distinction: Cardinal Beacon; Dolphin; Isolated Danger Beacon; Lateral Beacon; Obstruction; Safe Water Beacon; Special Purpose/General Beacon;

Inland specific Encoding Instructions:

- A) Piles or posts that are situated in the fairway or have a navigational function (e.g. leading post, post as a marker) have to be encoded.
- B) If the pile or post has a big diameter it should be encoded as a surface.
- C) The **feature name** (OBJNAM) attribute is mandatory for **Piles** (PILPNT) if the feature is a Structure Feature for a **Leading Light**, **Directional Light**, or **Sector Light**. In other situations, the attribute is optional for **Piles** (PILPNT).

8.5 Dyke

IHO Definition: **DYKE.** A dyke (or dike) is an artificial embankment to contain or hold back water. (Adapted from IHO Dictionary – S-32).

S-401 Geo Feature: Dyke (DYKCON) (O)

Primitives: Curve, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol
An aerial photograph showing a long, straight artificial embankment (dyke) running parallel to a coastline. The dyke is a dark grey-green color, contrasting with the surrounding green land and blue water. There are some buildings and roads along the base of the dyke.	A paper chart symbol for a dyke. It consists of a thick red line representing the top of the dyke, which is curved upwards at one end. Below the red line, there is a brown shaded area representing the land behind the dyke. To the left of the dyke, there is a small blue rectangle representing water.	An Inland ECDIS or ECS symbol for a dyke. It shows a brown shaded area representing the land behind the dyke, with a thin black line representing the top of the dyke itself. The symbol is contained within a larger brown polygon representing the landmass.

S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
condition	(CONDTN)	: under construction 2 : ruined : under reclamation 5 : planned construction	EN	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		: default name display 2 : alternate name display	(S) EN	0,1 †
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
height	(HEIGHT)	[xxx.x] metres, e.g., 27.4	RE	0,1
interoperability identifier		MRN (see clause 27.161)	URN	0,1
nature of construction	(NATCON)	: masonry 2 : concreted : loose boulders : hard surfaced : unsurfaced 6 : wooden 7 : metal	EN	0,*
radar conspicuous	(CONRAD)		BO	0,1
reported date	(SORDAT)	See clause 2.4.8	TD	0,1
vertical length	(VERLEN)		RE	0,1
visual prominence	(CONVIS)	: visually conspicuous 2 : not visually conspicuous 3 : prominent	EN	0,1
scale minimum	(SCAMIN)	[22000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*

file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFOM)		(S) TE	0,1 †
Vertical Uncertainty	(VERACC)		C	0, 1
Uncertainty Fixed	(POSACC) (SOUACC) (VERACC)	[xx.xx] (metres), e.g., 1.54	(S) RE	1, 1
Uncertainty Variable Factor			(S) RE	0, 1
Category of Temporal Variation	(CATTEV)	: Likely to Change : Unlikely to Change 6 : Unassessed	EN	0, 1
Pictorial Representation	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control : Police : Port : Immigration 6 : Health 7 : Coast Guard : Agricultural : Military : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		: Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed : Mariner Report, Not Confirmed : Industry Publications and Reports : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1

name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		: default name display 2 : alternate name display	(S) EN	0,1 [†]
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

8.5.1 Dykes

Dykes and seawalls are primarily designed to prevent inundation, and generally have regular outlines.

If it is required to encode a dyke, it must be done using the feature **Dyke**.

Remarks:

- If it is required to encode a dyke whose seaward edge is coincident with the shoreline, it must be done using **Dyke**, and with a **Shoreline Construction** feature of type curve along its seaward edge, with no value populated for attribute **category of shoreline construction**.
- When a **Dyke** feature is of type surface, it must be covered by a **Land Area** feature.
- At large optimum display scales, the dyke crown (the topline of the dyke) may be encoded as a **Slope Topline** feature (see clause 5.11), with attribute **category of slope** = 2 (embankment).

Distinction: Dam; Sloping Ground; Slope Topline.

Inland specific Encoding Instructions:

- When a dyke is coincident with the shoreline, it must be encoded as a **Dyke** (DYKCON).
- The altitude / elevation of the highest point of a dyke above the vertical reference level may be encoded by the attribute **HEIGHT**
- US: For **feature name** (OBJNAM) use name of levee or levee district.

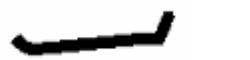
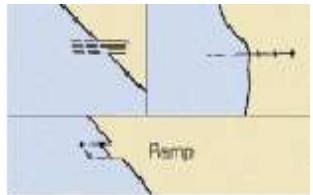
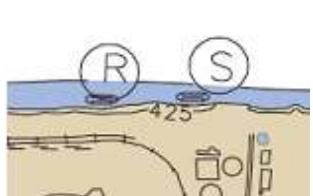
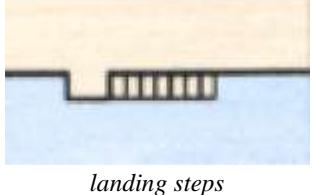
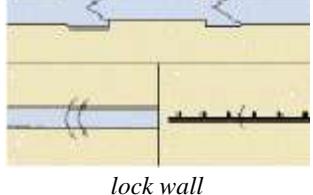
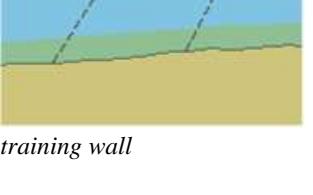
8.6 Shoreline construction

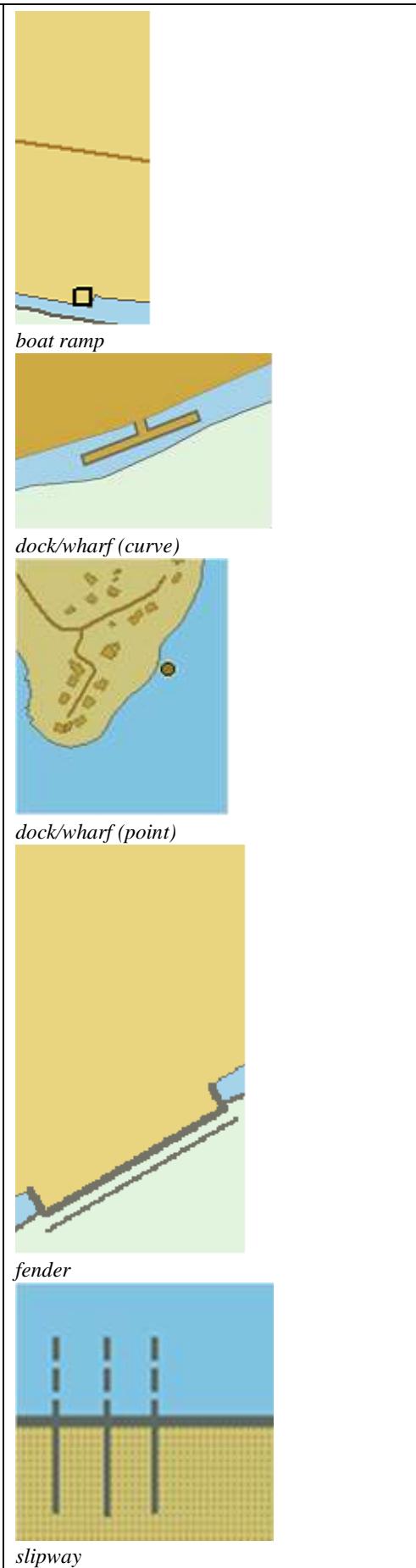
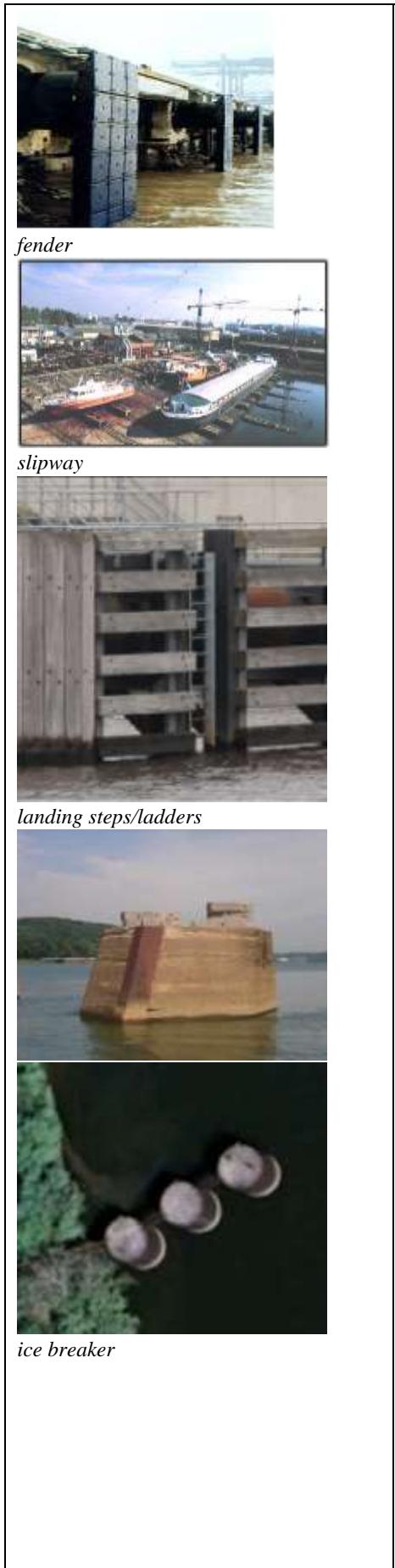
IHO Definition: **SHORELINE CONSTRUCTION**. A fixed artificial structure in the water and/or adjoining the land. It may also refer to features such as training walls, which are not necessarily connected to, nor form part of the shoreline. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.154, November 2000, as amended).

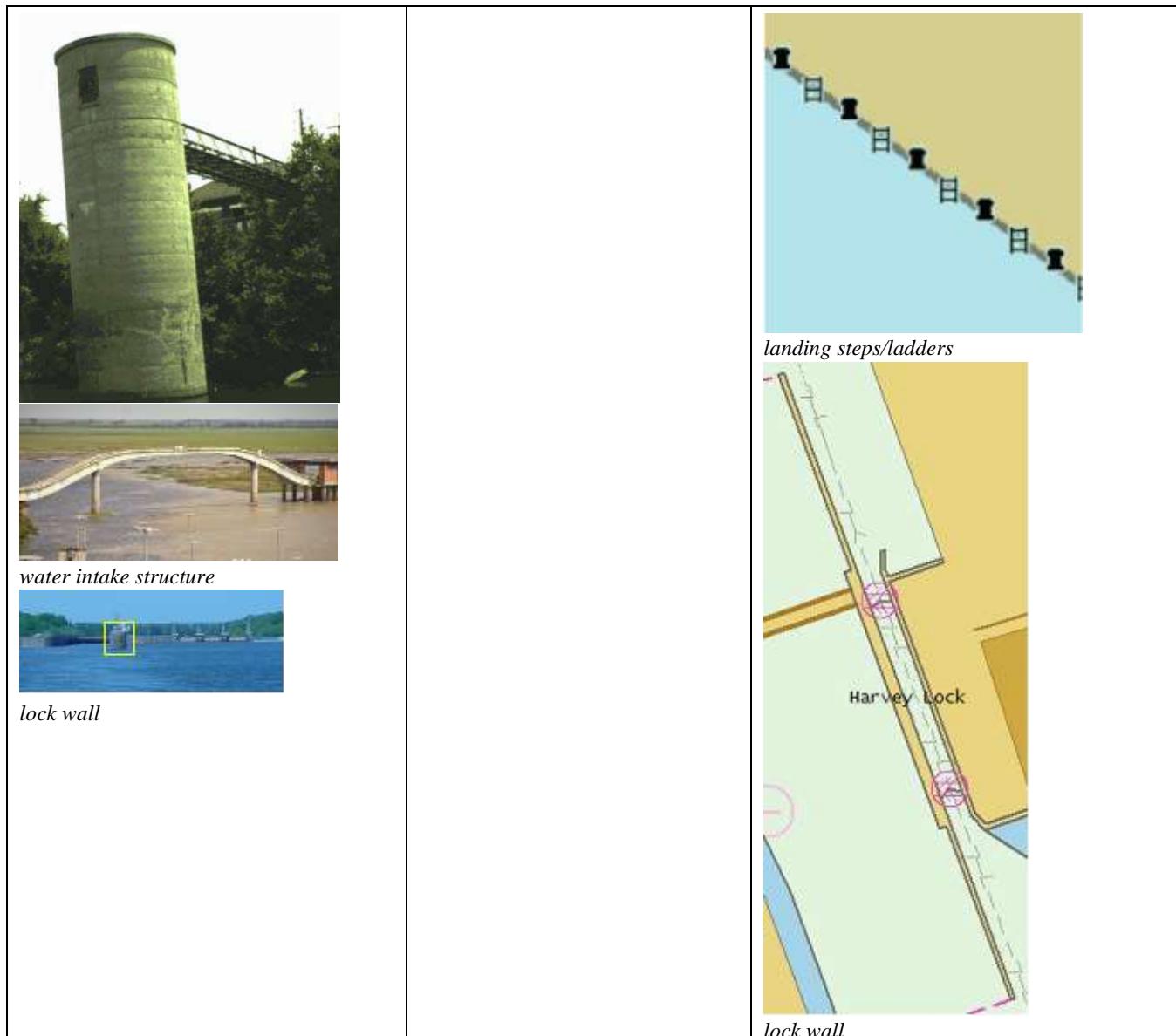
For IENCs **Shoreline Construction** includes groins, ground sills, revetments, training walls, boat ramps, slipways, docks, wharfs, lock walls, ice breakers, water intake structures, fenders, landing steps and ladders.

S-401 Geo Feature: Shoreline Construction (SLCONS, slcons) (C)

Primitives: Point, Curve, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol
 revetment	     	    
 rip rap		
 boat ramp		
 dock/wharf		





S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of shoreline construction	(CATSLC)	1 : breakwater 2 : groyne 3 : mole 4 : pier (jetty) 5 : promenade pier 6 : wharf 7 : training wall 8 : rip rap 9 : revetment 10 : sea wall 11 : landing steps 12 : ramp 13 : slipway 14 : fender 15 : solid face wharf 16 : open face wharf 17 : log ramp 18 : Lock/Guide Wall 19 : Ice Breaker 20 : swimming facility	EN	1,1

		21 : Water Intake Structure 22 : quay 23 : tie-up wall		
<i>colour</i>	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,* (ordered)
<i>colour pattern</i>	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1 [†]
<i>condition</i>	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
<i>feature name</i>		See clause 2.5.8	C	0,*
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
<i>fixed date range</i>		See clause 2.4.8	C	0,1
<i>date end</i>	(DATEND)		(S) TD	0,1 [†]
<i>date start</i>	(DATSTA)		(S) TD	0,1 [†]
<i>height</i>	(HEIGHT)		RE	0,1
<i>horizontal clearance fixed</i>			C	0,1
<i>horizontal clearance value</i>	(HORCLR)		(S) RE	1,1
<i>horizontal distance uncertainty</i>	(HORACC)	[xx.xx] (metres), e.g., 1.54	(S) RE	0,1
<i>horizontal length</i>	(HORLEN)		RE	0,1
<i>horizontal width</i>	(HORWID)		RE	0,1
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1

nature of construction	(NATCON)	1 : masonry 2 : concreted 3 : loose boulders 4 : hard surfaced 5 : unsurfaced 6 : wooden 7 : metal 8 : glass reinforced plastic 9 : Painted 11 : latticed	EN	0,*
<i>radar conspicuous</i>	(CONRAD)		BO	0,1
reported date	(SORDAT)	See clause 2.4.8	TD	0,1
<i>status</i>	(STATUS)	1 : permanent 2 : occasional 3 : recommended 4 : not in use 6 : reserved 7 : temporary 8 : private 12 : illuminated 13 : historic 14 : public 28 : buoyed	EN	0,*
<i>vertical length</i>	(VERLEN)		RE	0,1
<i>visual prominence</i>	(CONVIS)	1 : visually conspicuous 2 : not visually conspicuous 3 : prominent	EN	0,1
water level effect	(WATLEV)	1 : partly submerged at high water 2 : always dry 3 : always under water/ submerged 4 : covers and uncovers 5 : awash 6 : subject to inundation or flooding 7 : floating 8 : Above Mean Water Level 9 : Below Mean Water Level	EN	0,1
scale minimum	(SCAMIN)	22000 for curve and 45000 for surface features, if not otherwise specified in the inland specific encoding instructions or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
headline			(S) TE	0,1

language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFOM)		(S) TE	0,1 †
Vertical Uncertainty	(VERACC)	[xx.xx] (metres), e.g., 1.54	C	0, 1
Uncertainty Fixed	(POSACC) (SOUACC) (VERACC)		(S) RE	1, 1
Uncertainty Variable Factor			(S) RE	0, 1
Category of Temporal Variation	(CATTEV)	4 : Likely to Change 5 : Unlikely to Change 6 : Unassessed	EN	0, 1
Pictorial Representation	(PICREP)		TE	0, 1
UN Location Code	(unlocd)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *

<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Structure	Structure/Equipment (see clause 25.12)	Bollard, Daymark, Distance Mark, Fog Signal, Light All Around, Light Sectored, Notice Mark, Physical AIS Aid to Navigation, Radar Transponder Beacon, Signal Station Traffic, Signal Station Warning	Composition	0,1
The Component	Bridge Aggregation (see clause 25.3)	Bridge	Association	0,*
The Component	Lock Aggregation (see clause 25.23)	Lock Basin	Association	0,*
The Component	Cable Overhead Aggregation (see clause 0)	Cable Overhead	Association	0,*
The Component	Pipeline Overhead Aggregation (see clause 0)	Pipeline Overhead	Association	0,*
The Component	Anchorage Or Berth Aggregation (see clause 25.18)	Anchorage Area, Anchor Berth, Berth, Mooring Area	Association	0,*
The Component	Barrage Association (see clause 0)	Dam	Association	0,*
The Component	Exceptional Navigation Structure Aggregation (see clause 0)	Exceptional Navigation Structure	Association	0,*
The Component	Tunnel Aggregation (see clause 25.27)	Tunnel	Association	0,*
The Component	Aids to Navigation Association (see clause 25.2)	Fairway System, Traffic Separation Scheme, TwoWay Route	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
	Additional Information (see clause 25.1)	Nautical Information	Association	0,*

-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*
[†] The attribute colour pattern is mandatory for shoreline constructions that have more than one value populated for the attribute colour .				
Complex attribute feature name , sub-attribute name usage is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.				
For each instance of fixed date range , at least one of the sub-attributes date end or date start must be populated.				
For each instance of information , at least one of the sub-attributes file reference or text must be populated.				
<p>8.6.1 Coastline Natural sections of coastlines, lakeshores and riverbanks should be encoded as Coastline (see clause 5.3), whereas artificial sections of coastlines, lakeshores, riverbanks, canal banks and basin borders should be encoded as Shoreline Construction. The exception to this general rule is when a lake, river, canal, dock or basin is not navigable at the optimum display scale for the IENC data, in which case the boundaries must not be encoded as Coastline or Shoreline Construction. These features form the border of the Land Area feature.</p>				
<p>8.6.2 Artificial coastline If it is required to encode artificial sections of coastlines; or lakeshores, riverbanks, canal banks and basin borders that are navigable at the optimum display scale for the IENC data, this must be done using the feature Shoreline Construction.</p> <p>The largest optimum display scale IENC data should make clear whether any shoreline construction along the shoreline is intended for ships to berth alongside or not. In most instances, the associated detail (name or berth number, depths alongside, dolphins, cargo sheds, cranes or railway lines), in addition to the usually distinctive outline of such features as piers and jetties, will be sufficient to show that ships may come alongside. For shoreline constructions not intended to berth alongside (such as breakwaters and seawalls), an indication that ships do not go alongside may be given by encoding the sloping sides (for example the intertidal portion of the structure). If there is a possibility of misinterpretation by the boatmaster, the danger may be indicated by encoding an Obstruction surface feature (see clause 13.6) with the seaward edge running parallel to the shoreline construction.</p> <p>Figure 8-1 below represents a shoreline construction such as a mole, including a berthing facility, with a relatively flat top (<i>abcdlmna</i>), and sloping sides partly above high water (<i>nmldefgn</i>) and partly intertidal (<i>dopqrhgfed</i>).</p>				

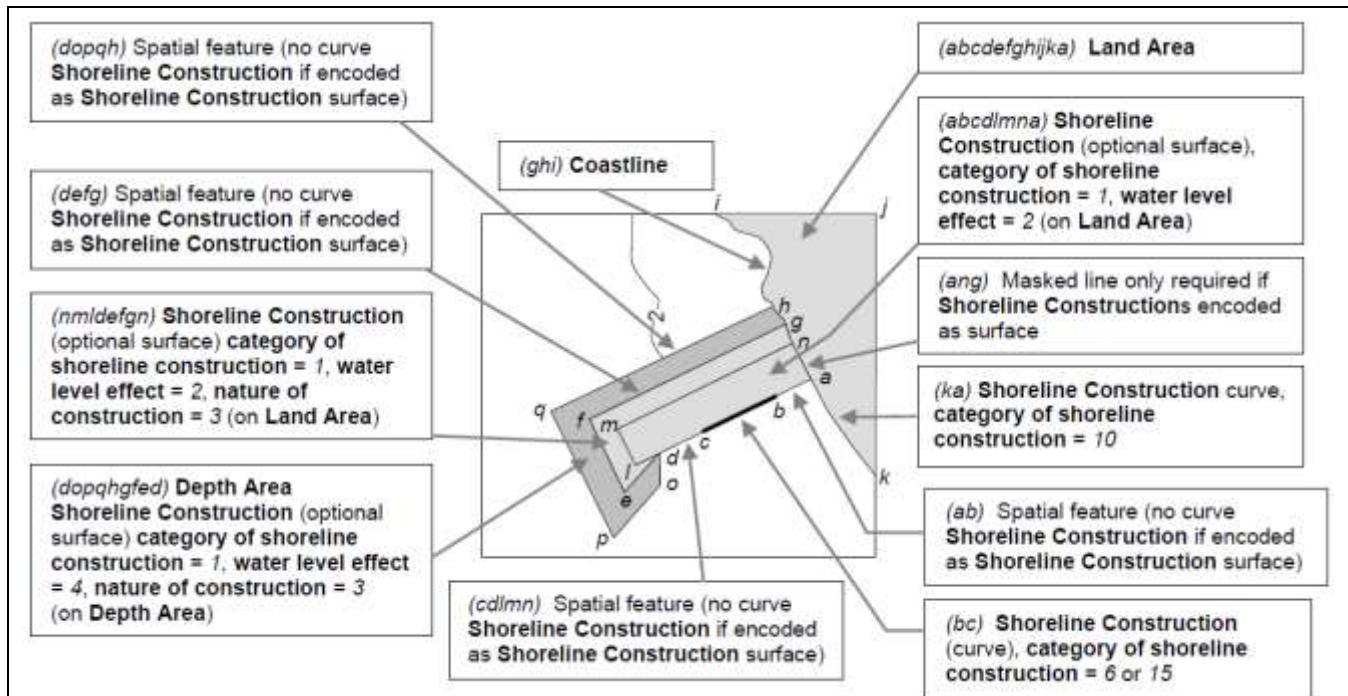


Figure 8-1 – Shoreline constructions

Remarks:

- Each of the three surface parts of the example shoreline construction above may be encoded as separate **Shoreline Construction** features of type surface; the masked curve (*ang*) must be encoded; and, if part of the **Shoreline Construction** boundary has a different characteristic (for example (*bc*) attribute **category of shoreline construction** = 6 or 15), it should be encoded as a separate **Shoreline Construction** feature of type curve. Alternatively, all the boundaries of the components of the shoreline construction may be encoded as **Shoreline Construction** features of type curve.
- In this example, the shoreline construction surface above the high water line must also be covered by a **Land Area** feature of type surface, and the intertidal shoreline construction surface must also be covered by a **Depth Area** feature of type surface with attribute **depth range minimum value** = -H (see clause 11.6.3).
- Shoreline Construction** features must be broken into their constituent parts where possible, and categorised using attributes such as **category of shoreline construction** and **water level effect** as indicated on the source.
- If the presence of a feature is only indicated on the source by a textual reference, without a clear symbol (for example 'pier', 'groyne', 'post'), it should be encoded using a **Caution Area** feature (see clause 16.11) or an **Information Area** feature (see clause 16.12), with the textual reference encoded using the complex attribute **information** (see clause 2.4.6). **Caution Area** should be used if the information is considered essential for safe navigation.
- Intertidal or submerged artificial rock walls, such as training walls that are not attached to the shoreline, must be encoded, if required, as **Shoreline Construction** using the appropriate value for **category of shoreline construction**, and **water level effect** = 3 (always under water/submerged) or **water level effect** = 4 (covers and uncovers).

Distinction: Causeway; Coastline; Dry Dock; Floating Dock; Gridiron; Land Area; Pontoon; Structure Over Navigable Water.

Inland specific Encoding Instructions:

- A) Groin:
 - i) If a curve feature is used it should denote the centreline of the structure.
 - ii) If large-scale information is available dykes/groins may be encoded as surface features. In that case **Shoreline Construction** (SLCONS, slcons) above the high water (US) / mean water (Europe) line must also be encoded with **Land Area** (LNDARE) (as a surface) and the intertidal **Shoreline Construction** must also be encoded with **Depth Area** (DEPARE, depare) (as a surface).
 - iii) If **Shoreline Construction** (SLCONS, slcons) is encoded as a surface, the border with the shore may optionally be masked.
 - iv) US: Groins (groyne) and dykes are considered synonymous. Use **feature name** (OBJNAM) (M) = "Groin" or "Dyke".
EUR: **Feature name** (OBJNAM) may be used to encode the name and/or operator/owner.
 - v) Groins shall be encoded when in or bordering to navigable water.
 - vi) **Scale minimum** (SCAMIN) is 45000 for curve features or 22000 for surface features in EUR and 45000 for all in US.
- B) Ground sill
 - i) If a curve feature is used it should denote the centreline of the structure.
 - ii) If large-scale information is available ground sills may be encoded as surface features. **Shoreline Construction** (SLCONS, slcons) must also be encoded with **Depth Area** (DEPARE, depare) (as a surface).
 - iii) If **Shoreline Construction** (SLCONS, slcons) is encoded as a surface, the border with the shore may optionally be masked.
 - iv) Ground sills shall be encoded if in navigable water and relevant when using an anchor, e.g. for manoeuvring or emergencies.
 - v) **Feature name** (OBJNAM) may be used to encode the name and/or operator/owner.
 - vi) **Scale minimum** (SCAMIN) is 45000 for curve features or 22000 for surface features.
- C) Revetment
 - i) Delineate outline of known structure. If area limits are unknown, delineate curve feature along the shoreline for the length of the structure.
 - ii) Revetment surfaces are generally available in very large scale and detailed vector data. For IENC purposes, revetment surfaces should be slightly generalized to reduce detail, but generalized larger into the channel in the context of safety.
 - iii) For loose stone / rip rap, use **category of shoreline construction** (CATSLC) = 8 (rip rap) with **nature of construction** (NATCON) = 3 (loose boulders).
 - iv) For concrete mattresses, use **category of shoreline construction** (catslc) = 9 (revetment) with **nature of construction** (NATCON) = 2 (concreted).
 - v) Where anchoring or using spuds is prohibited, encode **Restricted Area** (RESARE, resare) for sections of the revetment within the waterway.
 - vi) **Scale minimum** (SCAMIN) is 45000 for EUR and 30000 for US.
- D) Training wall
 - i) If a curve feature is used it should denote the centreline of the structure.
 - ii) If large-scale information is available training wall may be encoded as surface feature. In that case **Shoreline Construction** (SLCONS, slcons) above the high water (US) / mean water (Europe) line must also be encoded with **Land Area** (LNDARE) (as a surface) and the inter-tidal **Shoreline Construction** (SLCONS, slcons) must also be encoded with **Depth Area** (DEPARE, depare) (as a surface).
 - iii) If **Shoreline Construction** (SLCONS, slcons) is encoded as a surface, the border with the shore may optionally be masked.
 - iv) Inter-tidal or submerged artificial rock walls such as training walls, that are not attached to the shoreline are to be encoded in the following manner: **category of shoreline**

		construction (CATSLC) = 7 (training wall) with water level effect (WATLEV) = 3 (always under water/submerged) or water level effect (WATLEV) = 4 (covers and uncovers).
v)	US: Bendway weir: An upstream-angled low-elevation stone sill, built at an elevation low enough to allow normal river traffic to pass over unimpeded, designed to control and redirect currents and velocities throughout a bend of a river. Feature name (OBJNAM) (M) = "Bendway Weir"	
vi)	US: For Navigation Weirs see 8.12 (Dam)	
vii)	Training walls shall be encoded if in or bordering to navigable water	
viii)	Feature name (OBJNAM) may be used to encode the name and/or operator/owner.	
ix)	Scale minimum (SCAMIN) is 45000 for curve features or 22000 for surface features in EUR and 45000 for all in US.	
E)	Boat ramp	
i)	The boat ramp should be positioned just above the waterline to be clearly seen by the boatmaster.	
ii)	US: Use status (STATUS) 8 (private) or 14 (public) to indicate ownership, if known.	
iii)	Refer to Land Region (LNDRGN) for boat ramps that are not functional but are common landmarks or locations for reference.	
iv)	Boat ramps shall be encoded when they extend into navigable water	
v)	Feature name (OBJNAM) may be used to encode the name + "boat ramp".	
vi)	EUR: If the ISRS Location Code is available, it has to be encoded (refer to 2.4.13). If a maritime MRN or the RIS-ID is available, the attribute interoperability identifier has to be encoded (refer to Fehler! Verweisquelle konnte nicht gefunden werden.).	
vii)	Scale minimum (SCAMIN) is 8000 for EUR and 30000 for US.	
F)	Dock / wharf / pier	
i)	Land facilities should be represented with Buildings (BUISGL) and Silo / Tank (SILTNK) features.	
ii)	Docks and wharfs that are bordering to or located in navigable water must be encoded.	
iii)	Use category of shoreline construction (CATSLC) as follows:	
	• 4, Pier: facility is primarily a structure generally extending perpendicular from shoreline into water.	
	• 6, Wharf: facility is primarily a structure parallel to shoreline; use if details of 15 or 16 not known.	
	• 15, Solid face wharf: Facility consisting of a solid wall such that water cannot circulate underneath.	
	• 16, Open face wharf: Facility supported on piles or other structures that allow free circulation of water under the wharf.	
iv)	Scale minimum (SCAMIN) is 45000 for curve features or 22000 for surface features or 8000 for point features.	
G)	Fender	
i)	Place curve feature to accurately reflect the edge facing vessel traffic.	
ii)	Fenders need not have depictions of structural pylons behind the fender.	
iii)	For fending constructions like cells in waterway used to protect bridge piers, use category of shoreline construction (CATSLC) = 14 (fender); if the structure is greater than 3 m in diameter, use a surface feature. A Land Area (LNDARE) feature must be encoded underneath, if fender is not floating and water level effect (WATLEV) = 2. Use point feature for smaller objects.	
iv)	Fenders of type point or curve must be encoded if the whole object would not be depicted on the chart display otherwise.	
v)	Scale minimum (SCAMIN) is 22000 for EUR and 30000 for US.	
H)	Slipway	

- i) The outside edge of the slipway, both on land and in water, should be depicted as closely to its exact location as possible
- ii) Slipways that extend into navigable water must be encoded.
- iii) **Feature name** (OBJNAM) may be used to encode the name of the facility or owner.
- iv) **Scale minimum** (SCAMIN) is 8000 for EUR and 45000 for US.
- I) Ice breaker
 - i) A **Land Area** (LNDARE) must be encoded beneath an ice breaker.
 - ii) Place **feature name** (OBJNAM), if known, on each ice breaker.
 - iii) Ice Breakers in navigable water shall be encoded. At least the first Ice Breakers on shore in the high water river bed should also be encoded if they are relevant for navigation.
 - iv) **Scale minimum** (SCAMIN) is 45000 for EUR and 60000 for US.
- J) Water intake structure
 - i) Place **feature name** (OBJNAM), if known, on each water intake structure.
 - ii) **Scale minimum** (SCAMIN) is 22000 for EUR and 45000 for US.
- K) Lock wall
 - i) The **Shoreline Construction** (SLCONS, slcons) feature must be coincident with a **Land Area** (LNDARE) feature.
 - ii) This feature must be included in a **Lock Aggregation**.
 - iii) **Scale minimum** (SCAMIN) is 22000 for EUR and 45000 for US.
- L) Supporting structures (e.g., pylons, piers) of landing steps or ladders should be coded when in the water. **Scale minimum** (SCAMIN) is 4000.
- M) Pontoons whose size is not sufficient to create a surface feature must be encoded as point **Shoreline Construction** (SLCONS, slcons) with **category of shoreline construction** (CATSLC) = 4 (pier/jetty). This also applies in case the real dimensions are not known and only a point feature can be encoded.
- N) Buildings that extend into water should be encoded as Dock/Wharf **Shoreline Construction** (SLCONS, slcons) with appropriate **category of shoreline construction** (CATSLC) attribute. Then the building should be placed on that dock.
- O) When a dyke is coincident with the shoreline, it must be encoded as a **Dyke** (DYKCON) and in addition a **Shoreline Construction** (SLCONS, slcons) of type curve, with **category of shoreline construction** (CATSLC) equal "unknown", along its seaward border.

8.7 Structure over navigable water

<p>IHO Definition: STRUCTURE OVER NAVIGABLE WATER. A roofed structure erected, or partly erected, over a body of water, to provide protection for a vessel or its cargo.</p> <p>S-401 Geo Feature: Structure Over Navigable Water</p> <p>Primitives: Surface</p>				
<p><i>Real World</i></p>   	<p><i>Paper Chart Symbol</i></p>		<p><i>ECDIS Symbol</i></p>	
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of structure		1 : boathouse 2 : covered bulk terminal 3 : covered wharf 4 : covered service terminal 5 : covered passenger terminal	EN	0,*
colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,* (ordered)
colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared	EN	0,1 †

		5 : stripes (direction unknown) 6 : border stripe		
condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
feature name			C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
height	(HEIGHT)		RE	0,1
horizontal clearance fixed			C	1,1
horizontal clearance value	(HORCLR)		(S) RE	1,1
horizontal distance uncertainty	(HORACC)		(S) RE	0,1
horizontal length	(HORLEN)		RE	0,1
horizontal width	(HORWID)		RE	0,1
interoperability identifier		MRN (see clause 27.161)	URN	0,1
nature of construction	(NATCON)	1 : masonry 2 : concreted 6 : wooden 7 : metal 8 : glass reinforced plastic 11 : latticed 12 : glass	EN	0,*
periodic date range		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
product	(PRODCT)	7 : chemicals 12 : iron ingots 13 : salt 21 : cement 22 : grain 25 : clay	EN	0,1
radar conspicuous	(CONRAD)		BO	0,1
reported date	(SORDAT)	See clause 2.4.8	TD	0,1
status	(STATUS)	1 : permanent 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 12 : illuminated 14 : public	EN	0,*
vertical clearance fixed			C	1,1
vertical clearance value	(VERCLR)		(S) RE	1,1
vertical uncertainty	(VERACC)		(S) C	0,1

uncertainty fixed			(S) RE	1,1
uncertainty variable factor			(S) RE	0,1
vertical datum	(VERDAT)	3 : mean sea level 12 mean lower low water 13 : low water 16 : mean high water 17 : mean high water springs 18 : high water 19 : approximate mean sea level 20 : high water springs 21 : mean higher high water 24 : local datum 25 : international great lakes datum 1985 26 : mean water level 28 : higher high water large tide 29 : nearly highest high water 30 : highest astronomical tide 31 : (Local low water reference level) 32 : (Local high water reference level) 33 : (Local mean water reference level) 34 : (Equivalent height of water (German GIW)) 35 : (Highest Shipping Height of Water (German HSW)) 36 : (Reference low water level according to Danube Commission) 37 : (Highest shipping height of water according to Danube Commission) 38 : (Dutch river low water reference level (OLR)), 39 (Russian project water level) 40 : (Russian normal backwater level) 41 : (Ohio River Datum) 44 : baltic sea chart datum 2000	EN	0,1
vertical length	(VERLEN)		RE	0,1
visual prominence	(CONVIS)	1 : visually conspicuous 2 : not visually conspicuous 3 : prominent	EN	0,1
scale minimum	(SCAMIN)	US: 18750; EU: 22000 or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
headline			(S) TE	0,1

language		ISO 639-2/T	(S) TE	0,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
pictorial representation	(PICREP)	See clause 2.4.12.2	TE	0,1
Waterway Distance	(wtwdis)	[xxxx.xxx] (units defined in distance unit of measurement), e.g., 2451.732	RE	0, 1
distance unit of measurement	(hunits)	1 : metres 2 : yards 3 : kilometres 4 : statute miles 5: nautical miles 7 : hectometres	EN	0,1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Roofed Structure	Roofed Structure Aggregation (see clause 25.10)	Pylon/Bridge Support	Aggregation	0,1
The Structure	Structure/Equipment (see clause 25.12)	Daymark, Distance Mark, Fog Signal, Light All Around, Light Sectored, Notice Mark, Physical AIS Aid to Navigation, Radar Transponder Beacon, Signal Station Traffic, Signal Station Warning	Composition	0,1
The Collection	Notice Mark Aggregation (see clause 0)	Notice Mark	Aggregation	0,*
The Component	Aids to Navigation Association (see clause 25.2)	Fairway System, Traffic Separation Scheme, Two-Way Route	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

† The sub-attribute **colour pattern** is mandatory for structures over navigable water that have more than one value populated for the sub-attribute **colour**.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the Mariner. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

8.7.1 Structures over navigable water

If it is required to encode a roofed structure that is over or partially extends over navigable water to provide protection for a vessel or its cargo, it must be done using the feature **Structure Over Navigable Water**.

The value of the vertical clearance between (high) water level and any fixed overhead obstruction must always be given, where known, on the largest optimum display scale IENC data intended for navigation under the structure, and for detailed passage planning. The datum above which clearances are given must be a high water level. For structures over navigable water, the value for the vertical clearance must be encoded using the complex attribute **vertical clearance fixed**, and sub-attributes populated relevant to the feature.

Remarks:

- If it is required to encode the minimum depth for a covered berth or the maximum permitted vessel draught allowed at the berth, this must be done by populating the attributes **minimum berth depth** and **maximum permitted draught**, respectively, for the associated **Berths** feature (see clause 8.14).
- Navigable water under the covering structure must be encoded using the features **Depth Area**, **Dredged Area** or **Unsurveyed Area** (and appropriate **Depth Contour** and **Sounding** features) if the waterway is navigable at the optimum display scale for the IENC data, or using the features **Land Area** if the waterway is not navigable at the optimum display scale for the IENC data.
- The attribute **height** is used, where required, to encode the height of the highest point on the covering structure (see clause 2.5.7).

- The complex attribute **feature name** must only be encoded, if required, where the name of the structure is different to the name of the associated berth.
- Value 13 (low water) for attribute **vertical datum** is only applicable to enclosed (inland) waterways; and must not be used to indicate the reference datum for vertical clearances in tidal waters.
- In navigable water, roof supporting pylons/stanchions must be encoded, where possible, using a **Pylon/Bridge Support** feature (see clause 6.12), with the mandatory attribute **category of pylon** populated as empty (null). The **Pylon/Bridge Support** features must be associated to the **Structure Over Navigable Water** using the association **Roofed Structure Aggregation** (see clause 25.10).
- If possible, it is strongly recommended that an image or graphic of the structure is included, using the attribute **pictorial representation**.
- If available and considered important for route planning and/or monitoring, the vertical uncertainty associated with encoded vertical clearance values should also be encoded.

Distinction: Berth; Building; Harbour Facility; Landmark; Shoreline Construction; Small Craft Facility.

Inland specific Encoding Instructions:

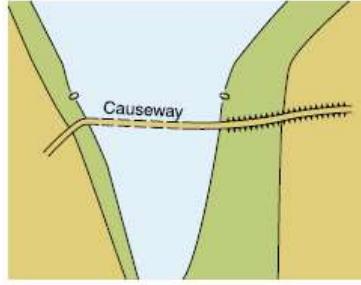
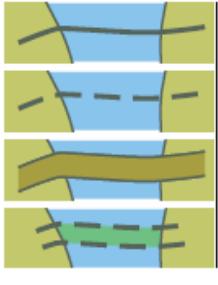
- All the objects beneath the roof, building or hall which are important for navigation (e.g. shoreline constructions, mooring facilities, pontoons, cranes, conveyors) have to be encoded additionally.
- Normally it is sufficient to encode the smallest vertical clearance within the area of the object. If there is e.g. a container crane under the roof, it is sufficient to encode the vertical clearance of the crane.
- If the smallest vertical clearance is only valid for a small object beneath a **Structure Over Navigable Water** and it is important to provide information about the bigger vertical clearance under the rest of the building, the vertical clearance has to be encoded for both objects. This should only be done in justified cases to avoid cluttering of the display.
- Place LIGHTS, if applicable.
- Use **vertical datum** (verdat) only if vertical datum differs:
 - from DSPM VDAT subfield and
 - from Meta feature **Vertical Datum Of Data** (m_vdat).
- If there is no vertical clearance indicator near the building, but there is a gauge which can be used to calculate the vertical clearance of the building depending on the water level, it should be encoded in accordance with 22.15.

8.8 Causeway

IHO Definition: **CAUSEWAY.** A raised way across low or wet ground or water. (IHO Dictionary – S-32).

S-401 Geo Feature: Causeway (CAUSWY) (O)

Primitives: Curve, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
				
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
interoperability identifier		MRN (see clause 27.161)	URN	0,1
nature of construction	(NATCON)	1 : masonry 2 : concreted 3 : loose boulders 4 : hard surfaced 5 : unsurfaced 6 : wooden 7 : metal	EN	0,*
reported date	(SORDAT)	See clause 2.4.8	TD	0,1
status	(STATUS)	1 : permanent 7 : temporary 8 : private 12 : illuminated 14 : public	EN	0,*

water level effect	(WATLEV)	1 : partly submerged at high water 2 : always dry 3 : always under water/ submerged 4 : covers and uncovers 5 : awash 6 : subject to inundation or flooding	EN	1,1
scale minimum	(SCAMIN)	[EUR: 45000; US: 60000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
Pictorial Representation	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1

.....Source	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

† Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

8.8.1 Causeways

A causeway is a raised roadway of solid structure built primarily to provide a route across wet ground or an intertidal area.

If it is required to encode a causeway, it must be done using the feature **Causeway**.

Remarks:

- No remarks.

Distinction: Dam; Road.

Inland specific Encoding Instructions:

- A) Include **Causeways** where vessels can see the car lights and traffic control lights from the water.

8.9 Canal

IHO Definition: **CANAL.** An artificial waterway with no flow, or a controlled flow, used for navigation, or for draining or irrigating land (ditch). (IHO Dictionary – S-32).

This feature is only used for non-navigable canals in Inland ENCs.

S-401 Geo Feature: Canal (CANALS) (O)

Primitives: Curve, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
<i>category of canal</i>	(CATCAN)	1 : transportation 2 : drainage 3 : irrigation	EN	0,1
<i>condition</i>	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
<i>feature name</i>		See clause 2.5.8	C	0,*
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 †
<i>fixed date range</i>		See clause 2.4.8	C	0,1
<i>date end</i>	(DATEND)		(S) TD	0,1 †
<i>date start</i>	(DATSTA)		(S) TD	0,1 †
<i>horizontal clearance fixed</i>			C	0,1
<i>horizontal clearance value</i>	(HORCLR)		(S) RE	1,1
<i>horizontal distance uncertainty</i>	(HORACC)		(S) RE	0,1
<i>horizontal width</i>	(HORWID)		RE	0,1
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>reported date</i>	(SORDAT)	See clause 2.4.8	TD	0,1
<i>status</i>	(STATUS)	1 : permanent 3 : recommended 4 : not in use 5 : periodic/intermittent 6 : reserved 8 : private 14 : public	EN	0,*
<i>scale minimum</i>	(SCAMIN)	[45000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
<i>file locator</i>			(S) TE	0,1

file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
Pictorial Representation	(PICREP)		TE	0, 1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*

The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

8.9.1 Canals

If it is required to encode a non-navigable canal, it must be done using the feature **Canal**.

Remarks:

- If the canal is navigable at the optimum display scale for the IENC data, it must be encoded using the features **Depth Area** or **Dredged Area** (see clauses 11.6 and 11.4), and the canal banks must be encoded using the features **Coastline** or **Shoreline Construction**. The canal must not be encoded as a **Canal** feature. If it is required to encode the name of the canal, it must be done using a **Sea Area/Named Water Area** feature, with attribute **category of sea area** = 51 (canal).
- Where the canal is navigable at the optimum display scale for the IENC data, special consideration should be given to encoding features specific to the canal such as minimum depths within the navigable area; overhead clearances; distances along the canal; and locks and lock gates (and any associated traffic signals).
- If it is required to encode a canal that is not navigable at the optimum display scale for the IENC data, it must be done using **Canal**, covered by a **Land Area** feature. The name of the canal should be encoded using the complex attribute **feature name** on the **Canal** feature.

Distinction: River; Lake; Tideway.

Inland specific Encoding Instructions:

- A) A **Canals** (CANALS) feature may not share the same geospatial position and geometry as a **Sea Area** (SEAARE) feature.
- B) Canals that can be used for navigation by e.g. pleasure craft should be encoded as **Depth Area** (DEPARE, depare) or **Unsurveyed Area** (UNSARE).

8.10 Distance mark

IHO Definition: **DISTANCE MARK.** A distance mark indicates the distance measured from an origin and consists of either a solid visible structure or a distinct location without special installation. Usually found on canals. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.55, November 2000).

On inland waterway it is used to serve as a reference along the waterway. Due to natural or historic changes in the waterway, the distance can deviate from real distance to the origin.

S-401 Geo Feature: Distance Mark (dismar) (C)

Primitives: Point

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
		 <p><i>Distance Mark along the waterway axis</i></p>		
		 <p><i>Distance Mark ashore</i></p>		
				
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity

distance mark visible	(CATDIS)		BO	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
interoperability identifier		MRN (see clause 27.161)	URN	0,1
measured distance value	(INFORM) (NINFORM)		C	0,1
distance unit of measurement		1 : metres 2 : yards 3 : kilometres 4 : statute miles 5: nautical miles 7 : hectometres	(S) EN	1,1
reference location			(S) TE	0,1
waterway distance		[xxxx.xxx (value of unit according to distance unit of measurementunit)]	(S) RE	1,1
scale minimum	(SCAMIN)	[EUR: 22000 (except: 8000 for distance unit of measurement=4), US: 120000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 [†]
waterway distance		[xxxx.xxx (value of unit according to distance unit of measurement)]	(S) RE	1,1
distance unit of measurement	(hunits)	1 : metres 2 : yards 3 : kilometres 4 : statute miles 5 : nautical miles 7 : hectometres	(S) EN	1,1
UN Location Code	(unlocd)		TE	0, 1
Category of Distance Mark	(CATDIS)	1 : Distance Mark Not Physically Installed 2 : Visible Mark, Pole 3 : Visible Mark, Board	EN	1, 1

		4 : Visible Mark, Unknown Shape		
Status	(STATUS)	5 : periodic/intermittent	EN	0, *
Reported Date	(SORDAT)		TD	0, 1
Pictorial Representation	(PICREP)		TE	0, 1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0, *
language		ISO 639-2/T	(S) TE	1, 1
name	(OBJNAM) (NOBJNM)		(S) TE	1, 1
name usage		1 : default name display 2 : alternate name display	(S) EN	0, 1 †
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity

The Equipment	Structure/Equipment (see clause 25.12)	Cardinal Beacon, Cardinal Buoy, Bridge, Building, Crane, Conveyor, Daymark, Dolphin, Emergency Wreck Marking Buoy, Fishing Facility, Floating Dock, Fortified Structure, Hulk, Installation Buoy, Isolated Danger Beacon, Isolated Danger Buoy, Landmark, Lateral Beacon, Lateral Buoy, Mooring Buoy, Notice Mark, Offshore Platform, Pile, Pipeline Overhead, Pontoon, Pylon/Bridge Support, Safe Water Beacon, Safe Water Buoy, Shoreline Construction, Silo/Tank, Span Fixed, Span Opening, Special Purpose/General Beacon, Special Purpose/General Buoy, Structure Over Navigable Water, Wind Turbine, Wreck	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

8.10.1 Distance marks

Marks which indicate distances along a channel in nautical miles, kilometres or some other unit of measure are considered to be useful on the largest optimum display scale IENC data.

If it is required to encode a distance mark, it must be done using the feature **Distance Mark**.

Remarks:

- The origin from which the distance has been measured can be indicated using the sub-attribute **reference location**.
- Where an encoded distance mark has the mandatory Boolean type attribute **distance mark visible** populated as *True*, the **Distance Mark** may also be associated to the structure supporting the mark using a **Structure/Equipment** feature association (see clause 25.12).
- For encoding a measured distance between two transits of marks established on the shore, see clause 15.3.2.

Distinction: Special Purpose/General Beacon.

Inland specific Encoding Instructions:

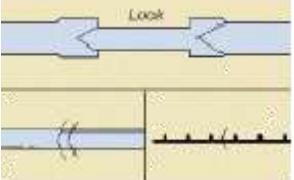
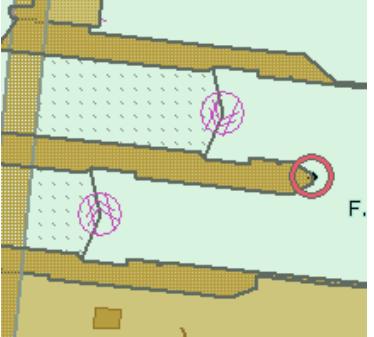
- A) If the distance deviates from real distance to the origin the simple attributes wtwdis and distance unit of measurement have to be encoded. If the distance mark is referring to a measured distance from an origin the complex attribute measured distance value can be encoded.
- B) **Distance mark** along waterway axis
 - i) EUR: Preferably the waterway axis shall be the middle line between the border lines of the navigable channel rather than the middle line between the riverbanks.
 - ii) Encode the referenced unit of measure using the **distance unit of measurement** attribute
 - iii) The point has to be a connected node.
 - iv) If the ISRS Location Code is available it has to be encoded (refer to 2.4.13). If a maritime MRN or a RIS-ID is available, the attribute **interoperability identifier** must be encoded (refer to **Fehler! Verweisquelle konnte nicht gefunden werden.**).
 - v) Negative values of **waterway distance** (wtwdis) are allowed.
 - vi) EUR: **Distance Marks** along the Waterway Axis must be encoded.
 - vii) **Scale minimum** (SCAMIN) is 8000 for EUR and 120000 for US.
- C) **Distance mark** ashore
 - i) **Distance marks** ashore may be either stones or signs, from the encoding point of view this is no difference.
 - ii) EUR: For hectometre distance marks, use **distance unit of measurement** = 7 (hectometres)
For kilometre distance marks, use **distance unit of measurement** = 3 (kilometres), e.g., 1147 for km or 4 for hm
 - iii) Negative values of **waterway distance** (wtwdis) are allowed.

8.11 Gate

IHO Definition: **GATE**. A structure that may be swung, drawn, or lowered to block an entrance or passageway on a watercourse. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2012).

S-401 Geo Feature: Gate (GATCON, gatcon) (M)

Primitives: Point, Curve, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
 Lock gate	 Lock gate	 Lock gate		
 Opening barrage (aerial view)				
 Opening barrage (boatmaster's view)				
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of gate	(CATGAT)	2 : flood barrage gate 3 : caisson 4 : lock gate 5 : dyke gate 6 : sluice	EN	1,1
condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
depth range minimum value	(DRVAL1)		RE	0,1

<i>feature name</i>		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
horizontal clearance open			C	1,1 †
horizontal clearance value	(HORCLR)	[xx.x] (metres), e.g., 34.2	(S) RE	1,1
horizontal distance uncertainty	(HORACC)	[xx.xx] (metres), e.g., 1.54	(S) RE	0,1
interoperability identifier		MRN (see clause 27.161)	URN	0,1
<i>nature of construction</i>	(NATCON)	1 : masonry 2 : concreted 6 : wooden 7 : metal	EN	0,*
<i>quality of vertical measurement</i>	(QUASOU)	2 : depth or least depth unknown 3 : doubtful sounding 4 : unreliable sounding 6 : least depth known 7 : least depth unknown, safe clearance at value shown	EN	0,*
status	(STATUS)	1 : permanent 4 : not in use 6 : reserved 16 : watched 17 : unwatched	EN	0,*
vertical clearance open			C	0,1
vertical clearance unlimited			S (BO)	1,1
vertical clearance value	(VERCLR)	[xx.xx] (metres), e.g., 13.27	(S) RE	1,1
vertical uncertainty	(VERACC)		(S) C	0,1
uncertainty fixed		[xx.xx] (metres), e.g., 1.54	(S) RE	1,1
uncertainty variable factor			(S) RE	0,1
vertical datum	(VERDAT)	3 : Mean Sea Level 10 : Approximate Lowest Astronomical Tide 12 : Mean Lower Low Water 13 : low water 16 : Mean High Water 17 : Mean High Water Springs 18 : High Water 19 : Approximate Mean Sea Level 20 : High Water Springs 21 : Mean Higher High Water 23 : Lowest Astronomical Tide 24 : Local Datum 25 : International Great Lakes Datum 1985 26 : Mean Water Level	EN	0,1

		28 : Higher High Water Large Tide 29 : Nearly Highest High Water 30 : Highest Astronomical Tide 31 : Local Low Water Reference Level 32 : Local High Water Reference Level 33 : Local Mean Water Reference Level 34 : Equivalent Height of Water (German GIW) 35 : Highest Shipping Height of Water (German HSW) 36 : Reference Low Water Level According to Danube Commission 37 : Highest Shipping Height of Water According to Danube Commission 38 : Dutch River Low Water Reference Level (OLR) 39 : Russian Project Water Level 40 : Russian Normal Backwater Level 41 : Ohio River Datum 43 : Dutch High Water Reference Level 44 : Baltic Sea Chart Datum 2000 45 : Dutch Estuary Low Water Reference Level (OLW)		
<i>vertical uncertainty</i>	(SOUACC)		C	0,1
uncertainty fixed			(S) RE	1,1
uncertainty variable factor			(S) RE	0,1
scale minimum	(SCAMIN)	[22000 (except EUR 90000 for CATGAT =2)] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
UN Location Code	(unlocd)		TE	0, 1
Category of Temporal Variation	(CATTEV)	4 : Likely to Change 5 : Unlikely to Change 6 : Unassessed	EN	0, 1
Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1

distance unit of measurement		1 : metres 2 : yards 3 : kilometres 4 : statute miles 5: nautical miles	EN	1,1
waterway distance		[xxxx.xxx (value of unit according to distance unit of measurementunit)]	RE	1,1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0, *
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 †
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Component	Lock Aggregation (see clause 25.23)	Lock Basin	Association	0, *
The Component	Barrage Association (see clause 0)	Dam	Association	0,1

The Component	Exceptional Navigation Structure Aggregation (see clause 0)	Exceptional Navigation Structure	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, NonStandard Working Day, Service Hours, Nautical Information, Time Schedule In General	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] For encoded gates that are navigable at the optimum display scale of the IENC data, the attribute **horizontal clearance open** is mandatory.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

The sub-attribute **vertical clearance value** for the complex attribute **vertical clearance open** is mandatory if the sub-attribute **vertical clearance unlimited** is set to *False*.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

8.11.1 Gates

If it is required to encode a gate that controls the flow of water, it must be done using the feature **Gate**. Gates should always be encoded in the closed (to the sea) position.

Remarks:

- **Gate** of type surface must also be covered by a **Depth Area**, **Dredged Area**, **Unsurveyed Area** or **Land Area** feature.
- The attribute **depth range minimum value** is used to encode the minimum depth over the sill, where known.
- Value 13 (low water) for attribute **vertical datum** is only applicable to enclosed (inland) waterways; and must not be used to indicate the reference datum for vertical clearances in tidal waters.
- Where the vertical clearance of the gate in the open position is unlimited, the Boolean sub-attribute **vertical clearance unlimited** must be set to *True*.

Distinction: Dry Dock; Floating Dock.

Inland specific Encoding Instructions:

- A) Linear **Gates** (GATCON, gatcon) features should follow the edge of **Depth Area** (DEPARE, depare) that defines the lock chamber. Surface **Gate** (GATCON, gatcon) features have to be placed on a **Depth Area**.
- B) Encode attribute **vertical datum** (VERDAT) only if vertical datum differs:
 - from DSPM VDAT subfield and
 - from Metadata feature **Vertical Datum of Data** (M_VDAT) attribute and specific for inland navigation or in case of a lifting barrage gate that restricts the air draught.
- C) **Vertical clearance value** (VERCLR) has to be encoded in case of a lifting lock door, lifting barrage gate or gate-frame that restricts the air draught of passing vessels.
- D) **waterway distance** (wtwdis) and **distance unit of measurement** shall be encoded if the attribute **vertical clearance value** (VERCLR) is used.

- E) Use **name of vertical river datum reference level** (vcrlev) and **vertical river datum reference level value** (vcrval) if the local value and name of vertical river datum reference level (design waterlevel) is known.
- F) EUR: A RIS-ID is assigned to each single **Gate** (GATCON, gatcon) feature and to the **Nautical Information** feature associated to the entire lock (refer to 2.4.13 and **Fehler! Verweisquelle konnte nicht gefunden werden.**).
- G) Lock gates
 - i) All lock gates must be encoded.
- H) Opening barrage
 - i) For non-navigable parts of a flood barrage use **Dam** (DAMCON) unless the current has an influence on navigation. For parts of a barrier/ flood barrage that are navigable at certain water levels or have an influence on navigation use **Gate** (GATCON, gatcon) (see instruction D).
 - ii) All objects of one Flood Barrage must be associated by a **Barrage Association**ⁱⁱⁱ⁾ The object name of a barrage is assigned to the associated **Nautical Information** feature using **feature name** (OBJNAM).
 - iii) If a structured external XML-file with more detailed communication information is available, the reference to the file has to be entered in the **file reference** (TXTDSC) attribute.
 - iv) Opening barrages shall be encoded if they are located in navigable water.
- I) A bridge over a lock gate or barrier / flood barrage needs to be encoded separately with a **Bridge** feature (see 6.6)

8.12 Dam

IHO Definition: **DAM.** A barrier to check or confine anything in motion; particularly one constructed to hold back water and raise its level to form a reservoir, or to prevent flooding. (IHO Dictionary – S-32).

S-401 Geo Feature: Dam (DAMCON) (O)

Primitives: Curve, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of dam	(CATDAM)	1 : weir 2 : dam 3 : flood barrage	EN	1,1
colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,* (ordered)
colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1 [†]
condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
fixed date range		See clause 2.4.8	C	0,1

date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
<i>height</i>	(HEIGHT)		RE	0,1
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
nature of construction	(NATCON)	1 : masonry 2 : concreted 3 : loose boulders 6 : wooden 7 : metal	EN	0,*
<i>radar conspicuous</i>	(CONRAD)		BO	0,1
<i>status</i>	(STATUS)	1 : permanent 2 : occasional 6 : reserved 7 : temporary 8 : private 14 : public 28 : buoyed	EN	0,*
<i>vertical length</i>	(VERLEN)		RE	0,1
<i>visual prominence</i>	(CONVIS)	1 : visually conspicuous 2 : not visually conspicuous 3 : prominent	EN	0,1
<i>water level effect</i>	(WATLEV)	1 : partly submerged at high water 2 : always dry 3 : always under water/ submerged 6 : subject to inundation or flooding	EN	0,1
scale minimum	(SCAMIN)	[EUR: 22000 (except 90000 for an opening barrage; US: 45000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 [†]
Vertical Uncertainty	(VERACC)		C	0, 1
Uncertainty Fixed	(POSACC) (SOUACC) (VERACC)	[xx.xx] (metres), e.g., 1.54	(S) RE	1, 1
Uncertainty Variable Factor			(S) RE	0, 1
Category of Temporal Variation	(CATTEV)	4 : Likely to Change 5 : Unlikely to Change 6 : Unassessed	EN	0, 1
Reported Date	(SORDAT)		TD	0, 1

<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 †
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Collection	Barrage Association (see clause 0)	Cable Overhead, Cardinal Buoy, Communication Area, Lateral Buoy, Lock Basin, Lock Basin Part, Notice Mark, Pipeline Overhead, Radio Calling-In Point, Restricted Area, Shoreline Construction, Signal Station Traffic, Signal Station Warning, Special Purpose General Buoy, Two-Way Route Part, Waterway Gauge	Association	0,*

The Component	Exceptional Navigation Structure Aggregation (see clause 0)	Exceptional Navigation Structure	Association	0,*
The Component	Lock Aggregation (see clause 25.23)	Lock Basin	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] The attribute **colour pattern** is mandatory for dams that have more than one value populated for the attribute **colour**.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

8.12.1 Dams

If it is required to encode a dam, weir or flood barrage, it must be done using the feature **Dam**; or as a **Landmark** feature (see clause 7.2) if the dam has geometry of type point.

Remarks:

- **Dam** features must be covered by a **Land Area** feature.
- The geometry of the dam includes any gates. Gates should be encoded as separate **Gate** features.
- If it is required to encode a dam whose seaward edge is coincident with the coastline, it must be done using **Dam**, with a **Shoreline Construction** feature of type curve along its seaward edge, with no value populated for the attribute **category of shoreline construction**.
- If it is required to encode a submerged weir, it should be done using a **Dam** feature, with attribute **water level effect** = 3 (always under water/submerged).

8.12.2 Flood barrages

If it is required to encode the fixed part of a flood barrage, and the flood barrage is inside an area which is navigable at the optimum display scale for the data, it must be done using a **Dam** feature, with attribute **category of dam** = 3 (flood barrage), and must be covered by a **Land Area** feature. If it is required to encode the opening part of the flood barrage, it must be done using a **Gate** feature, with attribute **category of gate** = 2 (flood barrage gate), and must be covered by a **Depth Area** feature.

When an encoded flood barrage is inside an area that is not navigable at the optimum display scale for the IENC data, the gates need not be encoded. In this case, the **Dam** feature must go all the way across the river or lake.

Remarks:

- None.

Distinction: Causeway; Dyke; Oil Barrier; Road.

Inland specific Encoding Instructions:

- A) If appropriate, place a **Restricted Area** (RESARE, resare) around dam, extending on both sides of the dam the length of the lock guidewall or the area that is marked by buoys.
- B) Use **feature name** (OBJNAM) option according to most commonly accepted name.
- C) US: Navigation Weir - a low dam built across a river to raise its level or divert its flow; constructed at an elevation low enough to allow river traffic to pass over it unimpeded during certain times of year. **Category of dam** (CATDAM) = 1 (weir) with appropriate **nature of construction** (NATCON).
- D) US: INFORM = "All waters immediately above and below the dam are designated as restricted areas."
- E) EUR & RU: If there are buoys or notice marks to mark the extent of the area, they have to be encoded.
- F) For openings in a barrier that are navigable at certain water levels see 8.11 **Gate**.
- G) All features which belong to a dam / barrier must be combined into one **Flood Barrage** association.
- H) The feature name of a barrage is assigned to the **Nautical Information** feature.
- I) If a structured external XML-file with more detailed communication information is available, the reference to the file has to be entered in the **file reference** (TXTDSC) attribute.

8.13 Crane

IHO Definition: **CRANE.** A machine for lifting, shifting and lowering objects or materials by means of a swinging boom or with a lifting apparatus supported on an overhead track. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

S-401 Geo Feature: Crane (CRANES, cranes) (C)

Primitives: Point, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
				
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of crane	(CATCRN)	2 : container crane/gantry 3 : sheerlegs 4 : travelling crane 5 : A-frame 6 : goliath crane	EN	1,1
colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,* (ordered)
colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1 [†]
condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

<i>height</i>	(HEIGHT)		RE	0,1
interoperability identifier		MRN (see clause 27.161)	URN	0,1
<i>lifting capacity</i>	(LIFCAP)		RE	0,1
<i>orientation</i>			C	0,1
orientation uncertainty			(S) RE	0,1
orientation value	(ORIENT)		(S) RE	1,1
<i>radar conspicuous</i>	(CONRAD)		BO	0,1
<i>radius</i>	(RADIUS)	Metres	RE	0,1
<i>status</i>	(STATUS)	1 : permanent 4 : not in use 6 : reserved 12 : illuminated	EN	0,*
vertical clearance fixed			C	0,1
vertical clearance value	(VERCLR)	[xx.xx] (metres), e.g., 13.27	(S) RE	1,1
vertical uncertainty			(S) C	0,1
uncertainty fixed	(VERACC)	[xx.xx] (metres), e.g., 1.54	(S) RE	1,1
uncertainty variable factor			(S) RE	0,1
vertical datum	(VERDAT)	3 : Mean Sea Level 10 : Approximate Lowest Astronomical Tide 12 : Mean Lower Low Water 13 : low water 16 : Mean High Water 17 : Mean High Water Springs 18 : High Water 19 : Approximate Mean Sea Level 20 : High Water Springs 21 : Mean Higher High Water 23 : Lowest Astronomical Tide 24 : Local Datum 25 : International Great Lakes Datum 1985 26 : Mean Water Level 28 : Higher High Water Large Tide 29 : Nearly Highest High Water 30 : Highest Astronomical Tide 31 : Local Low Water Reference Level 32 : Local High Water Reference Level 33 : Local Mean Water Reference Level 34 : Equivalent Height of Water (German GIW) 35 : Highest Shipping Height of Water (German HSW)	EN	0,1

		36 : Reference Low Water Level According to Danube Commission 37 : Highest Shipping Height of Water According to Danube Commission 38 : Dutch River Low Water Reference Level (OLR) 39 : Russian Project Water Level 40 : Russian Normal Backwater Level 41 : Ohio River Datum 43 : Dutch High Water Reference Level 44 : Baltic Sea Chart Datum 2000 45 : Dutch Estuary Low Water Reference Level (OLW)		
<i>vertical length</i>	(VERLEN)		RE	0,1
<i>visual prominence</i>	(CONVIS)	1 : visually conspicuous 2 : not visually conspicuous 3 : prominent	EN	0,1
scale minimum	(SCAMIN)	[EUR: 22000; US: 30000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
<i>pictorial representation</i>	(PICREP)	See clause 2.4.12.2	TE	0,1
in the water			BO	0,1
UN Location Code	(unloco)		TE	0, 1
Category of Temporal Variation	(CATTEV)	4 : Likely to Change 5 : Unlikely to Change 6 : Unassessed	EN	0, 1
Reported Date	(SORDAT)		TD	0, 1
Name of Vertical River Datum Reference Level	(vcrlev)		TE	0, 1
Vertical River Datum Reference Level Value	(vcrval)	[xx.xx] (metres), e.g., 1.15	RE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural	(S) EN	0, 1

		9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0, *
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Structure	Structure/Equipment (see clause 25.12)	Daymark, Distance Mark, Fog Signal, Light Air Obstruction, Light All Around, Light Sectored, Notice Mark, Physical AIS Aid to Navigation, Radar Transponder Beacon, Signal Station Traffic, Signal Station Warning	Composition	0,1
The Component	Aids to Navigation Association (see clause 25.2)	Fairway System, Traffic Separation Scheme, Two-Way Route	Association	0, *
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0, *
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, NonStandard Working Day, Service Hours, Nautical Information	Association	0, *
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0, *

[†] The attribute **colour pattern** is mandatory for cranes that have more than one value populated for the attribute **colour**.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

8.13.1 Cranes

If it is required to encode a crane, it must be done using the feature **Crane**.

Remarks:

- The purpose of charting these features is primarily to assist the boatmaster in identifying particular berths, etc.
- The complex attribute **orientation** is used, where required, to encode the angular distance from true north to the axis of the crane's jib (generally perpendicular to the wharf).
- The position of a sheerleg or a travelling crane is defined as its resting position. If it is required to encode the track, it must be done using the feature **Railway** (see clause 6.14).
- Where fitted, lights should be encoded as described in Section 19, with the **Crane** being used as the structure feature for the relevant light equipment feature(s) (see clause 18.2).
- For cranes located in navigable water, the Boolean attribute **in the water** must be set to *True* to indicate that the feature is to be included in the Inland ECDIS or ECS Base Display. Where such structures are located in the water it is not required to encode any supporting structures (for example piles, stilts).
- Value 13 (low water) for attribute **vertical datum** is only applicable to enclosed (inland) waterways; and must not be used to indicate the reference datum for vertical clearances in tidal waters.
- If available and considered important for route planning and/or monitoring, the vertical uncertainty associated with encoded vertical clearance values should also be encoded.

Distinction: Conveyor.

Inland specific Encoding Instructions:

- A) For surface features, delineate the perimeter of the crane.
- B) If a crane extends over navigable water it has to be encoded.
- C) EUR: If the ISRS Location Code is available, it must be encoded (refer to 2.4.13). If a maritime MRN or a RIS-ID is available, the attribute **interoperability identifier** must be encoded (refer to **Fehler! Verweisquelle konnte nicht gefunden werden.**).
- D) Use **name of vertical river datum reference level** (vcrlev) and **vertical river datum reference level value** (vcrval) if the local value and name of vertical river datum reference level (design waterlevel) is known.

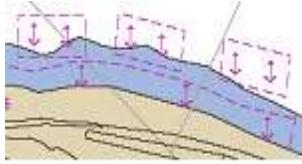
8.14 Berth

IHO Definition: **BERTH.** A place, generally named or numbered, where a vessel may moor or anchor. (IHO Dictionary – S-32).

For IENCs: A designated named or numbered place at the bank of the river or in a harbour basin for the mooring of vessels

S-401 Geo Feature: Berth (berths) (M)

Primitives: Point, Curve, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol
 Fleeting area	 Fleeting area	
 Transshipment berth		

S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of cargo		1 : bulk 2 : container 3 : general 4 : liquid 5 : passenger 6 : livestock 7 : dangerous or hazardous 8 : heavy lift 9 : ballast 10 : dry bulk cargo 11 : liquid bulk cargo 12 : reefer container cargo 13 : Ro-Ro cargo 14 : project cargo 15 : break bulk cargo	EN	0,*
feature name		See clause 2.5.8	C	1,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †

date start	(DATSTA)		(S) TD	0,1 †
<i>horizontal clearance length</i>			RE	0,1
<i>horizontal clearance width</i>			RE	0,1
interoperability identifier		MRN (see clause 27.161)	URN	0,2
<i>maximum permitted draught</i>	(INFORM) (NINFOM)		RE	0,1
minimum berth depth	(DRVVAL1)		RE	0,1
<i>periodic date range</i>		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
quality of vertical measurement	(QUASOU)	1 : depth known 2 : depth or least depth unknown 8 : Value Reported (Not Surveyed) 10 : Maintained Depth 11 : Not Regularly Maintained	EN	0,*
status	(STATUS)	1 : permanent 2 : occasional 3 : Recommended 4 : Not in Use 5 : periodic/intermittent 7 : temporary 8 : Private 9 : mandatory 12 : illuminated 14 : Public 16 : Watched 17 : Unwatched	EN	0,*
<i>vertical uncertainty</i>			C	0,1
uncertainty fixed	(SOUACC)		(S) RE	1,1
uncertainty variable factor			(S) RE	0,1
scale minimum	(SCAMIN)	[EUR: 22000 for surfaces, 12000 for points; US: 45000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFOM)		(S) TE	0,1 †
Transshipping Goods	(trshgd)	1 : Containers 2 : Bulk Goods 3 : Oil 4 : Fuel	EN	0, * †

		5 : Chemicals 6 : Liquid Goods 7 : Explosive Goods 8 : Fish 9 : Cars 10 : General Cargo		
UN Location Code	(unlocd)		TE	0, 1
Vertical Datum	(VERDAT) (Datum Level) (Reference Plane) (Levelling Datum) (Datum for Sounding Reduction) (Datum for Heights)	1 : mean low water springs 2 : mean lower low water springs 3 : mean sea level 4 : lowest low water 5 : mean low water 6 : lowest low water springs 7 : approximate mean low water springs 8 : indian spring low water 9 : low water springs 10 : Approximate Lowest Astronomical Tide 11 : nearly lowest low water 12 : Mean Lower Low Water 13 : low water 14 : approximate mean low water 15 : approximate mean lower low water 19 : approximate mean sea level 22 : equinoctial spring low water 23 : Lowest Astronomical Tide 24 : Local Datum 25 : international great lakes datum 1985 26 : mean water level 27 : lower low water large tide 30 : Highest Astronomical Tide 31 : Local Low Water Reference Level 32 : Local High Water Reference Level 33 : Local Mean Water Reference Level 34 : Equivalent Height of Water (German GIW) 35 : Highest Shipping Height of Water (German HSW) 36 : Reference Low Water Level According to Danube Commission 37 : Highest Shipping Height of Water According to Danube Commission 38 : Dutch River Low Water Reference Level (OLR) 39 : Russian Project Water Level 40 : Russian Normal Backwater Level 41 : Ohio River Datum	EN	0, 1

		43 : Dutch High Water Reference Level 44 : baltic sea chart datum 2000 45 : Dutch Estuary Low Water Reference Level (OLW)		
Category of Berth	(catbrt)	1 : Loading 2 : Unloading 3 : Overnight Accommodation 4 : Berth for Pushing-Navigation Vessels 5 : Berth for Other Vessels Than Pushing-Navigation Vessels 6 : Fleeting Area 7 : First Class Landing 8 : Second Class Landing 9 : Berth for Passenger Vessels 10 : waiting berth	EN	0, *
Class of Dangerous Cargo	(clsdng)	1 : One Blue Light / Cone 2 : Two Blue Lights / Cones 3 : Three Blue Lights / Cones 4 : No Blue Light / Cone 5 : One Red Light / Red Cone Top Down	EN	0, 1
Reported Date	(SORDAT)		TD	0, 1
Pictorial Representation	(PICREP)		TE	0, 1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs	(S) EN	0, 1

		12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data		
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Collection	Anchorage Or Berth Aggregation (see clause 25.18)	Anchor Berth, Bollard, Bunker Station, Communication Area, Mooring Area, Mooring Buoy, Notice Mark, Pile, Refuse Dump, Restricted Area, Shoreline Construction, Terminal, Vehicle Transfer	Aggregation	0,1
The Component	Anchorage Or Berth Aggregation (see clause 25.18)	Anchorage Area, Anchor Berth, Mooring Area	Association	0,*
The Component	Bridge Aggregation (see clause 25.3)	Bridge	Association	0,*
The Component	Lock Aggregation (see clause 25.23)	Lock Basin	Association	0,*
The Component	Exceptional Navigation Structure Aggregation (see clause 0)	Exceptional Navigation Structure	Association	0,*
The Component	Mooring Trot Aggregation (see clause 25.7)	Mooring Trot	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, NonStandard Working Day, Service Hours, Nautical Information, Time Schedule In General	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

8.14.1 Berths

Numbered, named or lettered berth information must be encoded on at least the largest optimum display scale IENC data, in order to assist the boatmaster in berthing activities within ports and harbours.

If it is required to encode a berth, it must be done using the feature **Berth**.

Remarks:

- The berth encodes the named place where a vessel can be moored adjacent to a shoreline construction. The shoreline construction itself should be encoded using the feature **Shoreline Construction** (see clause 8.6).
- The attributes **horizontal clearance length** and **horizontal clearance width** are used to encode the regulatory length and width of the navigable part of the berth as declared by a competent authority, where known.
- The mandatory complex attribute **feature name** is used to encode the name or number of the berth. The attributes **minimum berth depth** and **maximum permitted draught** are used to encode the shoalest physical depth and maximum draught permitted at the berth respectively, where known.
- Terminal facilities (for example container, tanker, ferry) must be encoded, where required, using the feature **Harbour Facility** (see clause 22.7).
- Landing places for boats should be encoded as small craft facilities (see clause 22.8).
- For encoding anchor berths, see clause 16.5.

Distinction: Anchor Berth; Bollard; Dock Area; Dolphin; Mooring Area; Mooring Buoy; Shoreline Construction; Structure Over Navigable Water; Terminal; Vehicle Transfer.

Inland specific Encoding Instructions:

- A) For **Anchorage Area** see 16.3.
- B) Where a berth may only be used for a limited period the duration should be indicated in **information** (INFORM). If the berth has special operating hours, the **Berth** feature can be combined with a **Time Schedule In General** (tisdge) feature (24.6)
- C) EUR: The linear extent of **Berth** feature is defined by markers or notice marks (signs E.5 – E.5.15, E.6, E.7 or E.7.1) on the bank.
- D) Within port areas it is allowed to encode **Berths** as curve features.
- E) Land facilities should be represented with **Building** (BUISGL) and **Silo / Tank** (SILTNK) or **Harbor Facility** (HRBFAC, hrbfac) features.
- F) If a structured external XML-file with more detailed communication information is available, the reference to the file has to be entered in the **file reference** (TXTDSC) attribute.
- G) The class of dangerous goods in accordance with ADN and the applicable police regulations: 1 (one blue light / cone, signs E.5.5, E.5.9, E.5.13), 2 (two blue lights / cones, signs E.5.6, E.5.10, E.5.14), 3 (three blue lights / cones, signs E.5.7, E.5.11, E.5.15), 4 (no blue lights / cones, signs E.5.4, E.5.8, E.5.12). Dangerous goods in accordance with inland waterway regulations of the Russian Federation: 5 (one red light / cone top down).
- H) EUR: If the ISRS Location Code is available, it has to be encoded (refer to 2.4.13). If a maritime MRN or a RIS-ID is available, the attribute **interoperability identifier** must be encoded (refer to **Fehler! Verweisquelle konnte nicht gefunden werden.**).
- I) If the **depth range minimum value** (DRVAL1) attribute is used, **quality of vertical measurement** (QUASOU), **uncertainty fixed** (SOUUACC) and **vertical datum** (VERDAT) should also be provided.
- J) Berth without transhipment / Fleeting Areas
 - i) US:
 - First Class Landing: An area providing tie-ups and at least 9 feet of water depth during low water level

- Second Class Landing: An area providing tie-ups and at least 9 feet of water depth during normal pool level

Mandatory attributes:

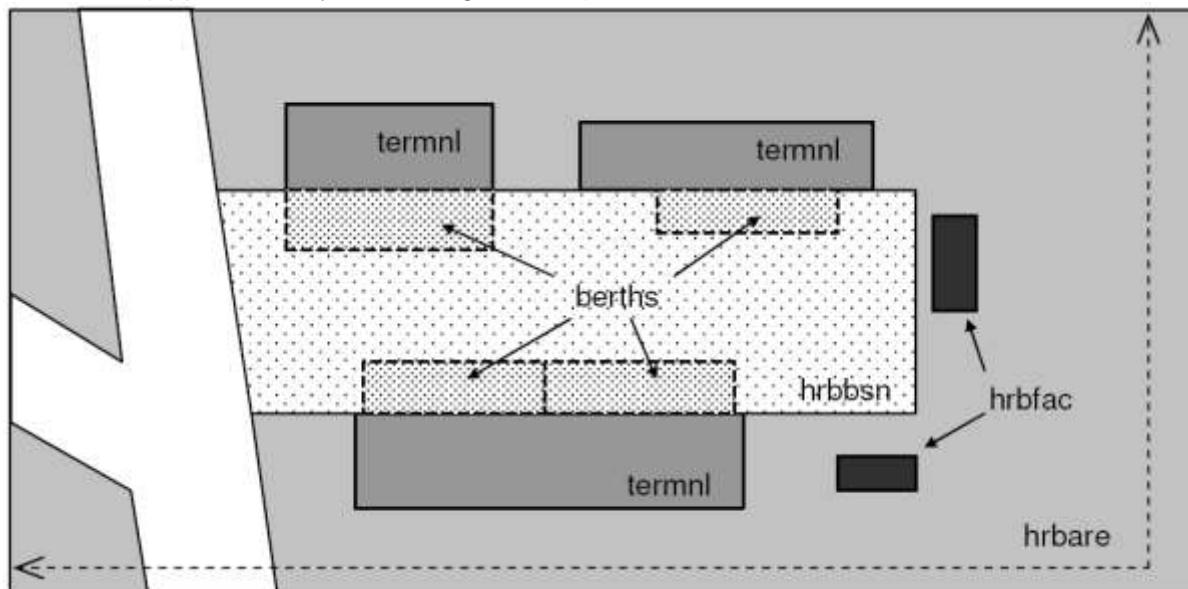
Category of berth (CATBRT) = 7 (first class landing) or 8 (second class landing)

Feature name (OBJNAM) = "First Class Landing" or "Second Class Landing" in both **Berth** (berths) and **Sea Area** (SEAARE).

- ii) US: Fleeting Areas: Area in waterway designated for temporary barge mooring. Mandatory attribute: **category of berth** (CATBRT) = 6 (fleeting area).
- iii) The **category of berth** 10 (waiting berth) should be used for a berth that is dedicated for vessels waiting for a bridge opening, lockage or other infrastructure. Even if a berth is dedicated to waiting, but other use (e.g. resting, staying over night) can be allowed by the operator of the infrastructure, it should also be encoded as waiting berth. A waiting berth of a lock or movable bridge shall be linked to the navigational structure for which vessels using this berth are waiting by the **Lock Aggregation, Bridge Aggregation**. For other types of infrastructure the type and name of the infrastructure should be encoded in the complex attributes **feature name** or **information**. A lock, movable bridge, harbour basin, transhipment installation etc. can be connected to several waiting berths, but a waiting berth can also be connected to e.g. several locks.
- iv) If the width of **Anchorage Area** (achare) is not defined by notice marks, consider using 110'/33.55 m (approximately three barge widths).

K) Transshipment berth

- i) If the width of a **Berth** is not defined by notice marks, consider using 110' / 33,55 m (approximately three barge widths).



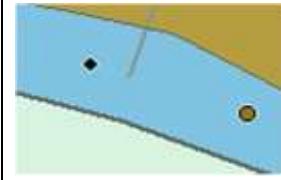
berths	Berths
hrbare	Harbour Area (see 16.16)
hrbbsn	Harbour Basin (see 8.25)
hrbfac	Harbour Facility (see 22.7)
termnl	Terminal (see 22.9)

8.15 Dolphin

IHO Definition: **DOLPHIN**. A post or group of posts, used for mooring or warping a vessel, or as an aid to navigation. The dolphin may be in the water, on a wharf or on the beach. (Adapted from IHO Dictionary – S32).

S-401 Geo Feature: Dolphin (MORFAC) (C)

Primitives: Point, Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>
		 Point cell (left); dolphin (right)

S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of dolphin	(CATMOR)	1 : mooring dolphin 2 : deviation dolphin 3 : berthing dolphin 4 : fender or breasting dolphin	EN	1,1
colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,* (ordered)
colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1 †
condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1

<i>elevation</i>	(ELEVAT)		RE	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
<i>fixed date range</i>		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
<i>height</i>	(HEIGHT)		RE	0,1
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
nature of construction	(NATCON)	1 : masonry 2 : concreted 6 : wooden 7 : metal	EN	0,*
<i>periodic date range</i>		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
<i>radar conspicuous</i>	(CONRAD)		BO	0,1
reported date	(SORDAT)	See clause 2.4.8	TD	0,1
<i>status</i>	(STATUS)	1 : permanent 2 : occasional 3 : recommended 4 : not in use 5 : intermittent 6 : reserved 7 : temporary 8 : private 12 : illuminated 14 : public 18 : existence doubtful	EN	0,*
<i>vertical length</i>	(VERLEN)		RE	0,1
<i>visual prominence</i>	(CONVIS)	1 : visually conspicuous 2 : not visually conspicuous 3 : prominent	EN	0,1
scale minimum	(SCAMIN)	[EUR: 22000; US: 30000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †

<i>pictorial representation</i>	(PICREP)	See clause 2.4.12.2	TE	0,1
Vertical Uncertainty	(VERACC)		C	0, 1
Uncertainty Fixed	(POSACC) (SOUACC) (VERACC)		(S) RE	1, 1
Uncertainty Variable Factor			(S) RE	0, 1
Category of Temporal Variation	(CATTEV)	4 : Likely to Change 5 : Unlikely to Change 6 : Unassessed	EN	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 †
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity

The Structure	Structure/Equipment (see clause 25.12)	Bollard, Daymark, Distance Mark, Fog Signal, Light Air Obstruction, Light All Around, Light Sectored, Notice Mark, Physical AIS Aid to Navigation, Radar Transponder Beacon, Signal Station Traffic, Signal Station Warning	Composition	0,1
The Component	Aids to Navigation Association (see clause 25.2)	Fairway System, Traffic Separation Scheme, Two-Way Route	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] The attribute **colour pattern** is mandatory for dolphins that have more than one value populated for the attribute **colour**.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

8.15.1 Dolphins

If it is required to encode a dolphin, it must be done using the feature **Dolphin**.

Remarks:

- If it is required to encode a dolphin beacon, this must be done using a beacon feature (see clauses 20.9-12), or a **Pile** feature (see clause 8.4).
- Dolphins that are disused and/or have fallen into disrepair must be encoded, where required, using **Obstruction** or **Pile** features.

Distinction: Pile; Shoreline Construction; Special Purpose/General beacon; Special Purpose/General Buoy;.

Inland specific Encoding Instructions:

- A) Surface feature should be used for structures greater than 3 metres in diameter.
- B) Use **Land Area** (LNDARE) beneath feature if not floating and code **water level effect** (WATLEV) = 2 for **Dolphin**.
- C) Place **feature name** (OBJNAM), if known, on each **Dolphin**.
- D) In an instance when a barge has been sunk near the shoreline and dolphins permanently attached to it, code each dolphin.

- E) In the event that a **Dolphin** (S) is used, it is also allowed to encode an additional **Dolphin** (P) to help aid in the display for planning purposes. The **DOLPHIN** (P) should be placed inside the **Dolphin** (S) on the side closest to the navigation channel.
- F) **Dolphins** that are located in navigable water must be encoded.

8.16 Bollard

IHO Definition: **BOLLARD**. Small shaped post, mounted on a wharf or dolphin used to secure ship's lines. (IHO Dictionary – S-32).

S-401 Geo Feature: Bollard (MORFAC) ©

Primitives: Point

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol	Type	Multiplicity
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		3 : default name display 2 : alternate name display	(S) EN	0,1 †
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
interoperability identifier		MRN (see clause 27.161)	URN	0,1
periodic date range		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
reported date	(SORDAT)	See clause 2.4.8	TD	0,1
status	(STATUS)	4 : permanent 2 : occasional 5 : recommended 6 : not in use 7 : Periodic/intermittend 6 : reserved 7 : temporary 12 : illuminated 8 : private	EN	0,*

		14 : public		
scale minimum	(SCAMIN)	[4000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
<i>pictorial representation</i>	(PICREP)	See clause 2.4.12.2	TE	0,1
Water Level Effect	(WATLEV)	9 : Partly Submerged at High Water 2 : Always Dry 10: Always Under Water/Submerged 11: Covers and Uncovers 12: Awash 6 : Subject to Inundation or Flooding	EN	0, 1
UN Location Code	(unlocd)		TE	0, 1
Category of Temporal Variation	(CATTEV)	13: Likely to Change 14: Unlikely to Change 6 : Unassessed	EN	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 15 : Police 16 : Port 17 : Immigration 6 : Health 7 : Coast Guard 18 : Agricultural 19 : Military 20 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1

.....Country Name			(S) TE	0, 1
Source Type		21 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 22 : Mariner Report, Not Confirmed 23 : Industry Publications and Reports 24 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		25 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Equipment	Structure/Equipment (see clause 25.12)	Dolphin, Fortified Structure, Hulk, Landmark, Offshore Platform, Pile, Pylon/Bridge Support, Shoreline Construction	Association	0,*
The Component	Anchorage Or Berth Aggregation (see clause 25.18)	Achorage Area, Anchor Berth, Berth, Mooring Area	Association	0,*
The Component	Exceptional Navigation Structure Aggregation (see clause 0)	Exceptional Navigation Structure	Association	0,*
The Component	Lock Aggregation (see clause 25.23)	Lock Basin	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*

-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*
[†] Complex attribute feature name , sub-attribute name usage is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.				
For each instance of fixed date range , at least one of the sub-attributes date end or date start must be populated.				
For each instance of information , at least one of the sub-attributes file reference or text must be populated.				
<p>8.16.1 Bollards If it is required to encode a bollard, it must be done using the feature Bollard.</p> <p>Remarks:</p> <ul style="list-style-type: none"> The identifier of designator for a bollard must be encoded, where required, using the complex attribute feature name. Bollards should be associated to the feature on which they are mounted using the association Structure/Equipment (see clause 25.12). <p>Distinction: Pile; Shoreline Construction.</p>				

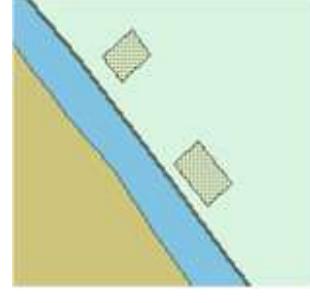
Inland specific Encoding Instructions:

8.17 Dry dock

IHO Definition: **DRY DOCK.** An artificial basin fitted with a gate or caisson, into which vessels can be floated and the water pumped out to expose the vessel's bottom. Also called graving dock. (IHO Dictionary – S-32).

S-401 Geo Feature: Dry Dock (DRYDOC) (O)

Primitives: Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
				
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
depth range minimum value	(DRVVAL1)	[x.xx] (metres), e.g., 2.74 or "unknown"	RE	0,1
elevation	(ELEVAT)		RE	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
horizontal clearance length			RE	0,1
horizontal clearance width	(HORCLR)	[xx.x] (metres), e.g., 34.2	RE	0,1
horizontal length	(HORLEN)	[xxx.xx] (metres), e.g., 133.22	RE	0,1
horizontal width	(HORWID)	[xxx.xx] (metres), e.g., 133.22	RE	0,1
interoperability identifier		MRN (see clause 27.161)	URN	0,1

<i>maximum permitted draught</i>	(INFORM) (NINFOM)		RE	0,1
<i>quality of vertical measurement</i>	(QUASOU)	2 : depth or least depth unknown 3 : doubtful sounding 4 : unreliable sounding 6 : least depth known 7 : least depth unknown, safe clearance at value shown 8 : value reported (not surveyed) 9 : value reported (not confirmed)	EN	0,*
<i>status</i>	(STATUS)	1 : permanent 4 : not in use 6 : reserved 8 : private 12 : illuminated 14 : public	EN	0,*
<i>vertical uncertainty</i>	(SOUACC) (VERACC)		C	0,1
uncertainty fixed		[xx.xx] (metres), e.g., 1.54	(S) RE	1,1
uncertainty variable factor			(S) RE	0,1
scale minimum	(SCAMIN)	[EUR: 12000; US: 18750] or see clause 2.5.9	IN	1,1
<i>information</i>	(INFORM)	See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFOM)		(S) TE	0,1 †
Horizontal Distance Uncertainty	(HORACC)	[xx.xx] (metres), e.g., 1.54	RE	0, 1
Category of Temporal Variation	(CATTEV)	4 : Likely to Change 5 : Unlikely to Change 6 : Unassessed	EN	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Reported Date	(SORDAT)		TD	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental	(S) EN	0, 1

		13 : Fishery 14 : Finance 15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0, *
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0, *
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, NonStandard Working Day, Service Hours, Nautical Information, Time Schedule In General	Association	0, *
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0, *

† Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

8.17.1 Dry docks

A dry dock (or graving dock) is an artificial basin into which a ship can be floated for cleaning and repairs. The entrance can be closed by gate or caisson and the water pumped out to expose the vessel's bottom.

If it is required to encode a dry dock, it must be done using the feature **Dry Dock**.

Remarks:

- A dry dock must also be covered by a **Land Area** feature. The boundary of a dry dock must not be encoded as a separate feature (**Coastline** or **Shoreline Construction**), except for the gate feature (**Gate**), which may be encoded.
- The attributes **horizontal clearance length** and **horizontal clearance width** are used to encode the regulatory length and width of the navigable part of the dry dock when the gate is open as declared by a competent authority, where known. If required, the minimum physical length and width of the dry dock itself must be populated using the attributes **horizontal length** and **horizontal width**.
- The attributes **depth range minimum value** and **maximum permitted draught** are used to encode the shoalest physical depth in the dock when the gate is open and maximum draught permitted in the dock respectively, where known.

Distinction: Dock Area; Floating Dock; Gate; Shoreline Construction.

Inland specific Encoding Instructions:

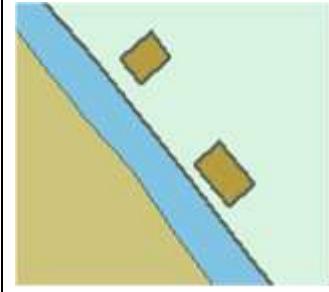
- A) Encode outline of entire structure.
- B) If a structured external XML-file with more detailed communication information is available, the reference to the file has to be entered in the **file reference** (TXTDSC) attribute.

8.18 Floating dock

IHO Definition: **FLOATING DOCK.** A form of dry dock consisting of a floating structure of one or more sections which can be partly submerged by controlled flooding to receive a vessel, then raised by pumping out the water so that the vessel's bottom can be exposed. (IHO Dictionary – S-32).

S-401 Geo Feature: Floating Dock (FLODOC, flodoc) (C)

Primitives: Curve, Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>
		

S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,* (ordered)
colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1 [†]
condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
depth range minimum value	(DRVAL1)	[x.xx] (metres), e.g., 2.74 or "unknown"	RE	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

<i>fixed date range</i>		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
horizontal clearance length			RE	0,1
horizontal clearance width	(HORCLR)	[xx.x] (metres), e.g., 34.2	RE	0,1
horizontal length	(HORLEN)	[xxx.xx] (metres), e.g., 133.22	RE	0,1
horizontal width	(HORWID)	[xxx.xx] (metres), e.g., 133.22	RE	0,1
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>lifting capacity</i>	(LIFCAP)		RE	0,1
<i>maximum permitted draught</i>	(INFORM) (NINFOM)		RE	0,1
<i>radar conspicuous</i>	(CONRAD)		BO	0,1
<i>status</i>	(STATUS)	1 : permanent 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 12 : illuminated	EN	0,*
<i>vertical length</i>	(VERLEN)		RE	0,1
<i>visual prominence</i>	(CONVIS)	1 : visually conspicuous 2 : not visually conspicuous 3 : prominent	EN	0,1
scale minimum	(SCAMIN)	[22000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFOM)		(S) TE	0,1 †
<i>pictorial representation</i>	(PICREP)	See clause 2.4.12.2	TE	0,1
Vertical Datum	(VERDAT) (Datum Level) (Reference Plane) (Levelling Datum) (Datum for Sounding Reduction) (Datum for Heights)	10 : Approximate Lowest Astronomical Tide 12 : Mean Lower Low Water 13 : Low Water 23 : Lowest Astronomical Tide 24 : Local Datum 31 : Local Low Water Reference Level 32 : Local High Water Reference Level 33 : Local Mean Water Reference Level 34 : Equivalent Height of Water (German GIW)	EN	0, 1

		35 : Highest Shipping Height of Water (German HSW) 36 : Reference Low Water Level According to Danube Commission 37 : Highest Shipping Height of Water According to Danube Commission 38 : Dutch River Low Water Reference Level (OLR) 39 : Russian Project Water Level 40 : Russian Normal Backwater Level 41 : Ohio River Datum 43 : Dutch High Water Reference Level 45 : Dutch Estuary Low Water Reference Level (OLW)		
Name of Sounding Datum Reference Level	(sdrlev)		TE	0, 1
Sounding Datum Reference Level Value	(sd rval)	[xx.xx] (metres), e.g., 2.05	RE	0, 1
Horizontal Distance Uncertainty	(HORACC)	[xx.xx] (metres), e.g., 1.54	RE	0, 1
Vertical Uncertainty	(VERACC)		C	0, 1
Uncertainty Fixed	(POSACC) (SOUACC) (VERACC)	[xx.xx] (metres), e.g., 1.54	(S) RE	1, 1
Uncertainty Variable Factor			(S) RE	0, 1
Category of Temporal Variation	(CATTEV)	4 : Likely to Change 5 : Unlikely to Change 6 : Unassessed	EN	0, 1
<i>Periodic Date Range</i>			C	0, *
Date End	(DATEND)		(S) TD	1, 1
Date Start	(DATSTA)		(S) TD	1, 1
Name of Vertical River Datum Reference Level	(vcrlev)		TE	0, 1
Vertical River Datum Reference Level Value	(vcrval)	[xx.xx] (metres), e.g., 1.15	RE	0, 1
Reported Date	(SORDAT)		TD	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime	(S) EN	0, 1

		16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0, *
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Structure	Structure/Equipment (see clause 25.12)	Daymark, Distance Mark, Fog Signal, Light All Around, Notice Mark, Physical AIS Aid to Navigation, Radar Transponder Beacon, Signal Station Traffic, Signal Station Warning	Composition	0,1
The Component	Aids to Navigation Association (see clause 25.2)	Fairway System, Traffic Separation Scheme, TwoWay Route	Association	0, *
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0, *
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, NonStandard Working Day, Service Hours, Nautical Information, Time Schedule In General	Association	0, *
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0, *

[†] The attribute **colour pattern** is mandatory for floating docks that have more than one value populated for the attribute **colour**.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of information, at least one of the sub-attributes file reference or text must be populated.

8.18.1 Floating docks

If it is required to encode a floating dock, it must be done using the feature Floating Dock.

Remarks:

- A **Floating Dock** feature must also be covered by **Depth Area**, **Dredged Area** or **Unsurveyed Area** features. The boundary of a **Floating Dock** feature of type surface must not be encoded as a separate feature (**Coastline** or **Shoreline Construction**).
- The attributes **horizontal clearance length** and **horizontal clearance width** are used to encode the regulatory length and width of the navigable part of the floating dock as declared by a competent authority, where known. If required, the minimum physical length and width of the dry dock itself must be populated using the attributes **horizontal length** and **horizontal width**.
- The attribute **depth range minimum value** is used to encode the shoalest depth of the dock when flooded, and the attribute **maximum permitted draught** is used to encode the maximum draught permitted in the dock, where known.

Distinction: Dock Area; Dry Dock.

Inland specific Encoding Instructions:

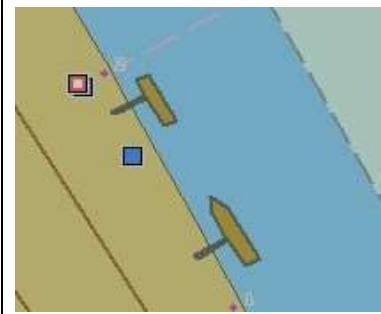
- A) If the water depth in the floating dock is referred to an inland waterway reference level, or if the available length and/or width of the dock is different from the physical length/width of the chamber, a **Depth Area** has to be coded underneath.
- B) If the **Floating Dock** has a special time schedule or special operating hours apply, the feature can be combined with a time schedule. For this purpose please refer to the **Time Schedule – In General** feature (tisdge) 24.6.
- C) If a structured external XML-file with more detailed communication information is available, the reference to the file has to be entered in the **file reference** (TXTDSC) attribute.
- D) **Floating Docks** that are permanently moored at a fixed location must be encoded.
- E) Use **name of Sounding datum reference level** (sdrlev) and **sounding datum reference level value** (sdrvval) if the local value and name of vertical river datum reference level (design waterlevel) is known.
- F) Use **name of vertical river datum reference level** (vcrlev) and **vertical river datum reference level value** (vcrval) if the local value and name of vertical river datum reference level (design waterlevel) is known.
- G) If the usable horizontal clearance of length and width are distances which are provided by the competent authority for safe navigation, they must be encoded with **horizontal clearance length** (horcll) and **horizontal clearance width** (horclw).

8.19 Pontoon

IHO Definition: **PONTOON.** A floating structure, usually rectangular in shape which serves as landing, pier head, bridge support, etc. (Adapted from IHO Dictionary – S-32).

S-401 Geo Feature: Pontoon (PONTON, ponton) (C)

Primitives: Curve, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol
		

S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
interoperability identifier		MRN (see clause 27.161)	URN	0,1
radar conspicuous	(CONRAD)		BO	0,1
periodic date range		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 12 : illuminated 14 : public	EN	0,*

<i>vertical length</i>	(VERLEN)		RE	0,1
<i>visual prominence</i>	(CONVIS)	1 : visually conspicuous 2 : not visually conspicuous 3 : prominent	EN	0,1
<i>scale minimum</i>	(SCAMIN)	[EUR: 12000; US: 30000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
<i>file locator</i>			(S) TE	0,1
<i>file reference</i>	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
<i>headline</i>			(S) TE	0,1
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>text</i>	(INFORM) (NINFORM)		(S) TE	0,1 †
<i>pictorial representation</i>	(PICREP)	See clause 2.4.12.2	TE	0,1
UN Location Code	(unlocd)		TE	0, 1
Vertical Uncertainty	(VERACC)		C	0, 1
Uncertainty Fixed	(POSACC) (SOUACC) (VERACC)	[xx.xx] (metres), e.g., 1.54	(S) RE	1, 1
Uncertainty Variable Factor			(S) RE	0, 1
Category of Temporal Variation	(CATTEV)	4 : Likely to Change 5 : Unlikely to Change 6 : Unassessed	EN	0, 1
Reported Date	(SORDAT)		TD	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports	(S) EN	0, 1

		10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data		
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Structure	Structure/Equipment (see clause 25.12)	Bollard, Daymark, Distance Mark, Fog Signal, Light All Around, Notice Mark, Physical AIS Aid to Navigation, Radar Transponder Beacon, Signal Station Traffic, Signal Station Warning	Composition	0,1
The Component	Bridge Aggregation (see clause 25.3)	Bridge	Association	0,*
The Component	Aids to Navigation Association (see clause 25.2)	Fairway System, Traffic Separation Scheme, TwoWay Route	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

8.19.1 Pontoons

If it is required to encode a pontoon, it must be done using the feature **Pontoon**.

Remarks:

- A **Pontoon** feature must also be covered by **Depth Area**, **Dredged Area** or **Unsurveyed Area** features. A **Pontoon** feature of type surface must not be bound by curve features **Coastline** or

Shoreline Construction, unless the edge associated with the curve feature is also the boundary of a **Land Area** feature of type surface.

Distinction: Bridge; Dolphin; Mooring Buoy; Shoreline Construction.

Inland specific Encoding Instructions:

- A) Place surface in location, orientation, and dimensions of the Real world object.
- B) If the landing stage or pontoon has a special time schedule or special operating hours apply, the feature can be combined with a time schedule. For this purpose please refer to the **Time Schedule - In General** feature (tisdge) (24.6).
- C) If a structured external XML-file with more detailed communication information is available, the reference to the file has to be entered in the **file reference** (TXTDSC) attribute.
- D) EUR: If the ISRS Location Code is available it has to be encoded (refer to 2.4.13). If a maritime MRN or a RIS-ID is available, the attribute **interoperability identifier** must be encoded (refer to **Fehler! Verweisquelle konnte nicht gefunden werden.**).
- E) A landing stage and pontoon shall be encoded if a hazard to navigation or when passing vessels are required to reduce speed.

8.20 Dock area

IHO Definition: DOCK AREA. An artificially enclosed area within which ships may moor and which may have gates to regulate water level. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.56, November 2000).

S-401 Geo Feature: Dock Area (DOCARE) (O)

Primitives: Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of dock	(CATDOC)	1: tidal 2: wet dock	EN	0,1
condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
horizontal clearance fixed			C	0,1
horizontal clearance value	(HORCLR)		(S) RE	1,1
horizontal distance uncertainty	(HORACC)		(S) RE	0,1
horizontal clearance length			RE	0,1
horizontal clearance width			RE	0,1
interoperability identifier		MRN (see clause 27.161)	URN	0,1
maximum permitted draught			RE	0,1
periodic date range		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
status	(STATUS)	1 : permanent 4 : not in use 6 : reserved 8 : private 14 : public	EN	0,*
scale minimum	(SCAMIN)	[22000] or see clause 2.5.9	IN	1,1

information	(INFORM)	See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 [†]
Pictorial Representation	(PICREP)		TE	0, 1
Reported Date	(SORDAT)		TD	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
Feature Associations				

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, NonStandard Working Day, Service Hours, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

8.20.1 Tidal and non-tidal basins

If it is required to encode a non-navigable dock area, it must be done using the feature **Dock Area**.

Remarks:

- If the dock is navigable at the optimum display scale of the IENC data, it must be encoded using the features **Depth Area**, **Dredged Area** or **Unsurveyed Area** (see clause 11.6.4), and the geo features making up the dock limits must be encoded using appropriate features such as **Coastline**, **Shoreline Construction** or **Gate**. The dock must not be encoded as **Dock Area**. If it is required to encode the name of the dock, it must be done using the feature **Sea Area/Named Water Area**.
- If it is required to encode a dock which is not navigable at the optimum display scale of the ENC data, it must be done using the feature **Dock Area**, covered by a **Land Area** or **Unsurveyed Area** feature. The name of the dock should be encoded using the complex attribute **feature name** on the **Dock Area**. The boundary of a dock must not be encoded as a separate feature (for example **Coastline**, **Shoreline Construction**), except for the gate feature (**Gate**) for a wet dock, which may be encoded.
- The complex attribute **horizontal clearance fixed** is used to encode the size of the entrance to the dock area, where required.
- The attributes **horizontal clearance length** and **horizontal clearance width** are used to encode the regulatory length and width of the navigable part of the dock area as declared by a competent authority, where known.
- In a non-tidal basin (wet dock), depths may refer to a sounding datum different from that in open waters. If this area is navigable at the optimum display scale of the IENC data, the value of this datum must be encoded using the Meta feature **Sounding Datum**, with attribute **vertical datum** = 24 (local datum), coincident with the area covered by the dock.
- In reality, smaller named, non-navigable dock areas (at the optimum display scale of the IENC data) may be included in major navigable dock areas, with different names or characteristics. To encode this fact, sea areas (**Sea Area/Named Water Area**) may overlap a **Dock Area**.

Distinction: Berth; Cargo Transhipment Area; Dry Dock; Floating Dock; Gate; Harbour Area (Administrative); Harbour Facility.

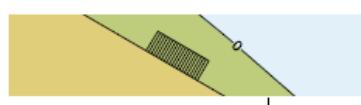
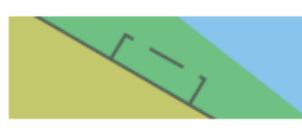
Inland specific Encoding Instructions:

8.21 Gridiron

IHO Definition: **GRIDIRON**. A structure in the intertidal zone serving as a support for vessels at low stages of the tide to permit work on the exposed portion of the vessel's hull. (IHO Dictionary – S-32).

S-401 Geo Feature: Gridiron (GRIDRN) (O)

Primitives: Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
				
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		: default name display 2 : alternate name display	(S) EN	0,1 †
horizontal length	(HORLEN)	[xxx.xx] (metres), e.g., 133.22	RE	0,1
horizontal width	(HORWID)	[xxx.xx] (metres), e.g., 133.22	RE	0,1
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
nature of construction	(NATCON)	: masonry 2 : concreted 6 : wooden 7 : metal 11 : latticed	EN	0,*
status	(STATUS)	: permanent : not in use 6 : reserved : private 14 : public 28 : buoyed	EN	0,*
vertical length	(VERLEN)	[xxx.x] (metres), e.g., 0.5	RE	0,1
water level effect	(WATLEV)	: partly submerged at high water : always under water/submerged : covers and uncovers 5 : awash	EN	0,1
scale minimum	(SCAMIN)	[EUR: 45000; US: 60000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †

headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
Condition	(CONDTN)	: Under Construction 2 : Ruined 5 : Planned Construction	EN	0, 1
Pictorial Representation	(PICREP)		TE	0, 1
Reported Date	(SORDAT)		TD	0, 1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control : Police : Port : Immigration 6 : Health 7 : Coast Guard : Agricultural : Military : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		: Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed : Mariner Report, Not Confirmed : Industry Publications and Reports : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		: default name display 2 : alternate name display	(S) EN	0,1 †
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*

The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

8.21.1 Gridirons

If it is required to encode a gridiron, it must be done using the feature **Gridiron**.

Remarks:

- Due to gridirons normally being located in intertidal areas, it is only required to encode **Gridiron** on the largest optimum display scale IENC data.

Distinction: Dry Dock; Floating Dock.

Inland specific Encoding Instructions:

- A) The vertical distance from seabed to the highest point of the gridiron should be encoded in **vertical length** (VERLEN).
- B) **Vertical length** measurements (VERLEN) do not require a datum.

8.22 Lock basin

IHO Definition: **LOCK BASIN.** A wet dock in a waterway, permitting a ship to pass from one level to another. (IHO Dictionary – S-32).

S-401 Geo Feature: Lock Basin (lokbsn) (M)

Primitives: Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol
		

S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
horizontal clearance fixed			C	0,1
horizontal clearance value	(HORCLR)	[xx.xx] (metres), e.g., 1.54	(S) RE	1,1
horizontal distance uncertainty	(HORACC)		(S) RE	0,1
horizontal length	(HORLEN)	[xxx.xx] (metres), e.g. 133.22	RE	0,1
horizontal width	(HORWID)	[xxx.xx] (metres), e.g. 133.22	RE	0,1
interoperability identifier		MRN (see clause 27.161)	URN	0,1
periodic date range		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1

<i>status</i>	(STATUS)	1 : permanent 4 : not in use 5 : periodic/intermittend 6 : reserved 8 : private 13 : historic 14 : public 16 : watched 17 : unwatched	EN	0,*
scale minimum	(SCAMIN)	[EUR: 12000; US: 30000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDTS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
UN Location Code	(unlocd)		TE	0, 1
Category of Temporal Variation	(CATTEV)	4 : Likely to Change 5 : Unlikely to Change 6 : Unassessed	EN	0, 1
Horizontal Clearance Uncertainty	(HORACC)	[xx.xx] (metres), e.g., 1.54	RE	0,1
Horizontal Clearance Length	(horcll)	[xxx.xx] (metres), e.g., 136.12	RE	1, 1
Condition	(CONDTN)	1 : Under Construction 2 : Ruined 3 : Under Reclamation 5 : Planned Construction	EN	0, 1
Reported Date	(SORDAT)		TD	0, 1
Pictorial Representation	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication	(S) EN	0, 1

		7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data		
.....Source	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Collection	Lock Aggregation (see clause 25.23)	Berth, Bollard, Bridge, Cable Overhead, Cardinal Buoy, Communication Area, Gate, Lock Basin, Lock Basin Part, Notice Mark, Pipeline Overhead, Radio Calling-In Point, Restricted Area, Shoreline Construction, Signal Station Traffic, Signal Station Warning, Span Fixed, Span Opening, Special Purpose Buoy, Two-Way Route Part, Waterway Gauge	Aggregation	0,*
The Component	Barrage Association (see clause 0)	Dam	Association	0,*
The Component	Exceptional Navigation Structure Aggregation (see clause 0)	Exceptional Navigation Structure	Association	0,*
The Component	Lock Aggregation (see clause 25.23)	Lock Basin	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1

-	Additional Information (see clause 25.1)	Contact Details, NonStandard Working Day, Service Hours, Nautical Information, Time Schedule In General	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

--For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

8.22.1 Locks

Remarks:

- If the lock is navigable at the optimum display scale of the IENC data, it must be encoded using the features **Depth Area** or **Dredged Area** (see clause 11.6.4), and the geo features making up the limits of the lock must be encoded using appropriate features such as **Coastline**, **Shoreline Construction** or **Gate**. If it is required to encode a lock that is not navigable at the optimum display scale of the IENC data, it must be done using **Lock Basin**, covered by a **Land Area** or **Unsurveyed Area** feature. The name of the lock should be encoded using the complex attribute **feature name** on the **Lock Basin** feature.
- The gates should be encoded as a **Gate** feature (see clause 8.11) with attribute **category of gate** = 4(lock gate) or 3(caisson). For smaller optimum display scale IENC data, a lock may be encoded using **Gate** only, without using **Lock Basin**.

Distinction: Canal; Gate.

Inland specific Encoding Instructions:

- A) If the usable horizontal clearance of length and width are distances which are provided by the competent authority for safe navigation, they must be encoded with **horizontal clearance length** (horcl) and **horizontal clearance width** (horclw).
- B) The minimum physical length and width given by the building itself must be encoded with **horizontal length** (HORLEN) and **horizontal width** (HORWID).
- C) All features of one lock must be associated to a **Lock Aggregation**.
- D) EUR: A RIS-ID is assigned to each single **Lock Basin** (lokbsn)= feature and to the **Nautical Information** feature associated with the entire lock (refer to 2.4.13 and **Fehler! Verweisquelle konnte nicht gefunden werden.**)
- E) If the **Lock Basin** has a special time schedule or special operating hours apply, the feature can be combined with a time schedule. For this purpose please refer to the **Time Schedule – In General** feature (tisdge) (24.6)
- F) If a structured external XML-file with more detailed communication information is available, the reference to the file has to be entered in the **file reference** (TXTDSC) attribute.

8.23 Mooring trot

IHO Definition: **MOORING TROT.** A mooring is a place where a vessel may be secured. (IHO Dictionary – S32).

A mooring trot is a mooring that is composed of ground tackle, mooring cables, buoys and mooring berths on junction cables.

S-401 Geo Feature: Mooring Trot (C_AGGR) €

Primitives: Surface, No Geometry

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		: default name display 2 : alternate name display	(S) EN	0,1 †
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
interoperability identifier		MRN (see clause 27.161)	URN	0,1
scale minimum	(SCAMIN)	[EUR: 22000; US: 30000] or see clause 2.5.9	IN	1,1
information	(INFORM)	See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
Pictorial Representation	(PICREP)		TE	0, 1
Reported Date	(SORDAT)		TD	0, 1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control : Police : Port : Immigration 6 : Health	(S) EN	0, 1

		7 : Coast Guard : Agricultural : Military : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		: Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed : Mariner Report, Not Confirmed : Industry Publications and Reports : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0, *
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		: default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Collection	Mooring Trot Aggregation (see clause 25.7)	Berth, Cable Submarine, Mooring Buoy, Obstruction	Aggregation	0,1
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0, *
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0, *
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0, *

† Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

8.23.1 Mooring trots

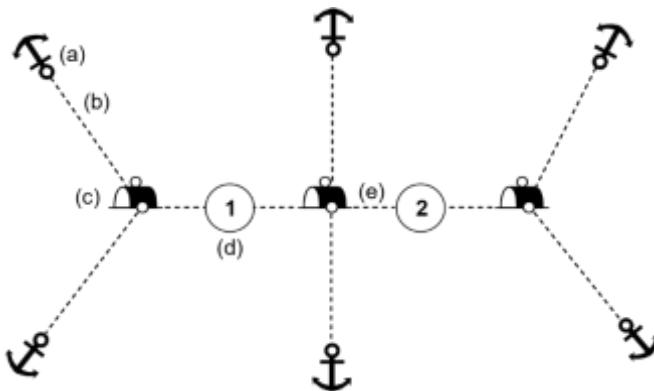


Figure 8-2 – Mooring trot

A complete mooring trot is composed of ground tackle, mooring cables, buoys and mooring berths on junction cables. The following remarks refer to the annotations in Figure 8-2 above:

- (a) Ground tackle should be encoded using **Obstruction** features (see clause 13.6), with attribute **category of obstruction** = 9 (ground tackle).
- (b) Mooring cables should be encoded using **Cable Submarine** features (see clause 14.2), with attribute **category of cable** = 6 (mooring cable).
- € Buoys should be encoded using **Mooring Buoy** features.
- (d) Mooring berths should be encoded using **Berth** features.
- € Junction cables should be encoded using **Cable Submarine** features, with attribute **category of cable** = 9 (junction cable).

All these features should be aggregated in a **Mooring Trot** feature, using the association **Mooring Trot Aggregation** (see clause 25.7), with the name of the mooring trot being populated using the complex attribute **feature name** for the **Mooring Trot**.

Remarks:

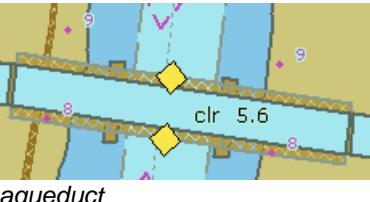
- If it is required to encode the name of a mooring trot, the **Mooring Trot** should be encoded using geometry of type surface. The extent of the surface should cover the extent of all the components of the mooring trot.
- If it is required to encode the extent of an unnamed mooring trot, this may be done using a **Mooring Trot** feature having no geometry.
- Names or numbers of individual moorings within the mooring trot must be encoded using the attribute **feature name** on the relevant **Berth** feature.

Distinction: Berth; Mooring Buoy; Mooring Area.

Inland specific Encoding Instructions:

- A) Mooring trots have to be encoded if they are in navigable water.

8.24 Exceptional Navigation Structure

<p>IHO Definition: An exceptional navigational construction like aqueduct, lift-lock, etc.</p> <p>S-401 Geo Feature: Exceptional Navigation Structure (excnst) (M)</p> <p>Super Type:</p> <p>Primitives: point, surface</p>				
<p><i>Real World</i></p>  <p><i>lift lock</i></p>  <p><i>aqueduct</i></p>  <p><i>aqueduct</i></p>		<p><i>Paper Chart Symbol</i></p>	<p><i>Inland ECDIS or ECS Symbol</i></p>  <p><i>aqueduct</i></p>	
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of Exceptional Structure	(catexs)	1 : Lift-Lock 2 : Aqueduct 3 : Sloping Plane Lock 4 : Water Slope Lock 5 : Other	EN	1, 1
UN Location Code	(unlocd)		TE	0, 1
Vertical Datum	(VERDAT) (Datum Level) (Reference Plane) (Levelling Datum) (Datum for Sounding Reduction)	10 : Approximate Lowest Astronomical Tide 12 : Mean Lower Low Water 23 : Lowest Astronomical Tide 24 : Local Datum 31 : Local Low Water Reference Level 32 : Local High Water Reference Level	EN	0, 1

	(Datum for Heights)	33 : Local Mean Water Reference Level 34 : Equivalent Height of Water (German GIW) 35 : Highest Shipping Height of Water (German HSW) 36 : Reference Low Water Level According to Danube Commission 37 : Highest Shipping Height of Water According to Danube Commission 38 : Dutch River Low Water Reference Level (OLR) 39 : Russian Project Water Level 40 : Russian Normal Backwater Level 41 : Ohio River Datum 43 : Dutch High Water Reference Level 45 : Dutch Estuary Low Water Reference Level (OLW)		
Condition	(CONDTN)	1 : Under Construction 2 : Ruined 3 : Under Reclamation 5 : Planned Construction	EN	0, 1
Scale Minimum	(SCAMIN)	[EUR: 90000; US: 300000] or see clause 2.5.9	IN	1, 1
<i>Fixed Date Range</i>			C	0, 1
Date End	(DATEND)		(S) TD	0, 1
Date Start	(DATSTA)		(S) TD	0, 1
<i>Periodic Date Range</i>			C	0, *
Date End	(DATEND)		(S) TD	1, 1
Date Start	(DATSTA)		(S) TD	1, 1
Reported Date	(SORDAT)		TD	0, 1
Name of Sounding Datum Reference Level	(sdrlev)		TE	0, 1
feature name		See clause 2.5.8	C	0, *
language		ISO 639-2/T	(S) TE	1, 1
name	(OBJNAM) (NOBJNM)		(S) TE	1, 1
name usage		1 : default name display 2 : alternate name display	(S) EN	0, 1 †
Sounding Datum Reference Level Value	(sdrvval)	[xx.xx] (metres), e.g., 2.05	RE	0, 1
<i>Horizontal Distance Uncertainty</i>	(HORACC)	[xx.xx] (metres), e.g., 1.54	RE	0, 1
Category of Temporal Variation	(CATTEV)	4 : Likely to Change 5 : Unlikely to Change 6 : Unassessed	EN	0, 1
Status	(STATUS)	5 : Periodic/Intermittent	EN	0, 1
Depth Range Minimum Value	(DRVAL1)	[x.xx] (metres), e.g., 2.74 or "unknown"	RE	1, 1
Horizontal Clearance Width	(horclw)	[xxx.xx] (metres), e.g., 25.17	RE	0, 1

Vertical Uncertainty	(VERACC)		C	0, 1
Uncertainty Fixed	(POSACC) (SOUACC) (VERACC)	[xx.xx] (metres), e.g., 1.54	(S) RE	1, 1
Uncertainty Variable Factor			(S) RE	0, 1
<i>Information</i>	(INFORM)		C	0, *
File Locator			(S) TE	0, 1
File Reference	(TXTDSC)		(S) TE	0, 1
Headline			(S) TE	0, 1
Language			(S) TE	1, 1
Text	(INFORM) (NINFOM)		(S) TE	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
interoperability identifier		MRN (see clause 27.161)	URN	0,1
Waterway Distance	(wtwdis)	[xxxx.xxx] (units defined in distance unit of measurement), e.g., 2451.732	RE	1, 1
distance unit of measurement	(hunits)	1 : metres 2 : yards 3 : kilometres 4 : statute miles 5: nautical miles 7 : hectometres	EN	0,1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs	(S) EN	0, 1

		12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data		
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Collection	Exceptional Navigation Structure Aggregation (see clause 0)	Berth, Bollard, Communication Area, Dam Depth Area, Gate, Lock Basin, Lock Basin Part, Notice Mark, Shoreline Construction, Signal Station Traffic, Signal Station Warning, Waterway Gauge	Composition	0,1
The Updated Object	Updated Information (see clause 25.17)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Non-Standard Working Day, Service Hours, Nautical Information, Time Schedule In General	Association	0,*
-	Spatial Association (see clause 25.11)	Spatial Quality	Association	0,*

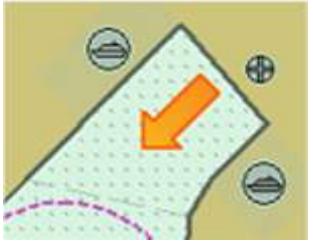
† Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

Inland specific encoding instructions:

- A) **depth range minimum value** (DRVAL1) represents the minimum operating depth of the structure.
- B) The exceptional structure does not carry information about the vertical clearance underneath. If the exceptional structure crosses navigable water (e.g., aqueduct) a **Bridge** feature must be encoded to provide the vertical clearance underneath.
- C) Use **vertical datum (VERDAT)** only if vertical datum differs:
 - from DSPM SDAT subfield and
 - from Metadata feature **Sounding Datum** (m_sdat) attribute
- D) Note: The vertical datum is the reference of the minimum operation depth of the exceptional structure.
- E) If the exceptional navigational structure has a special time schedule or special operating hours apply, the feature can be combined with a time schedule. For this purpose please refer to the **Time Schedule – In General** feature (tisdge) 24.6.

- F) Restricted vertical clearance within the lock chamber should be encoded by the respective features (e.g., **Gate** (GATCON, gatcon), **Span Fixed** (bridge), **Span Opening** (bridge), **Cable Overhead** (cblohd))
- G) EUR: If the ISRS Location Code is available it shall be encoded (refer to 2.4.13. If a maritime MRN or RIS-ID is available, the attribute **interoperability identifier** must be encoded (refer to **Fehler! V erweisquelle konnte nicht gefunden werden.**).
- H) For Notice Marks on aqueducts see 20.17.
- I) All features which belong to an **Exceptional Navigation Structure** must be combined into one **Exceptional Navigation Structure** aggregation.
- J) The object name of an **Exceptional Navigational Structure** complex is assigned to the **Nautical Information** feature using **feature name** (OBJNAM) if it is not sufficient to encode the **feature name** of the **Exceptional Navigation Structure** itself..
- K) If a structured external XML-file with more detailed communication information is available, the reference to the file has to be entered in the **file reference** (TXTDSC) attribute.
- L) For encoding an Aqueduct: If the usable horizontal clearance of width is a distance which is provided by the competent authority for safe navigation, it must be encoded with **horizontal clearance width** (HORCLW).
- M) Use **name of sounding datum reference level** (SDRLEV) and **sounding datum reference level value** (SDRVAL) if the local value and name of vertical river datum reference level (design waterlevel) is known.

8.25 Harbour Basin

<p>IHO Definition: An enclosed area of water surrounded by quay walls constructed to provide means for the transfer of cargos from and to ships.</p> <p>S-401 Geo Feature: Harbour Basin (hrbbsn) ©</p> <p>Super Type:</p> <p>Primitives: surface</p>				
<i>Real World</i> 	<i>Paper Chart Symbol</i>		<i>Inland ECDIS or ECS Symbol</i>	
				
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Horizontal Length	(HORLEN)	[xxx.xx] (metres), e.g., 133.22	RE	0, 1
Horizontal Width	(HORWID)	[xxx.xx] (metres), e.g., 133.22	RE	0, 1
UN Location Code	(unlocd)		TE	0, 1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		: default name display 2 : alternate name display	(S) EN	0,1 †
Scale Minimum	(SCAMIN)	[12000] or see clause 2.5.9	IN	1, 1
Reported Date	(SORDAT)		TD	0, 1
<i>Fixed Date Range</i>			C	0, 1
Date End	(DATEND)		(S) TD	0, 1
Date Start	(DATSTA)		(S) TD	0, 1
<i>Periodic Date Range</i>			C	0,*
Date End	(DATEEND)		(S) TD	1, 1
Date Start	(DATSTA)		(S) TD	1, 1
Status	(STATUS)	5 : Periodic/Intermittent	EN	0, 1
Information	(INFORM)		C	0,*
File Locator			(S) TE	0, 1
File Reference	(TXTDSC)		(S) TE	0, 1
Headline			(S) TE	0, 1
Language			(S) TE	1, 1
Text	(INFORM) (NINFORM)		(S) TE	0, 1

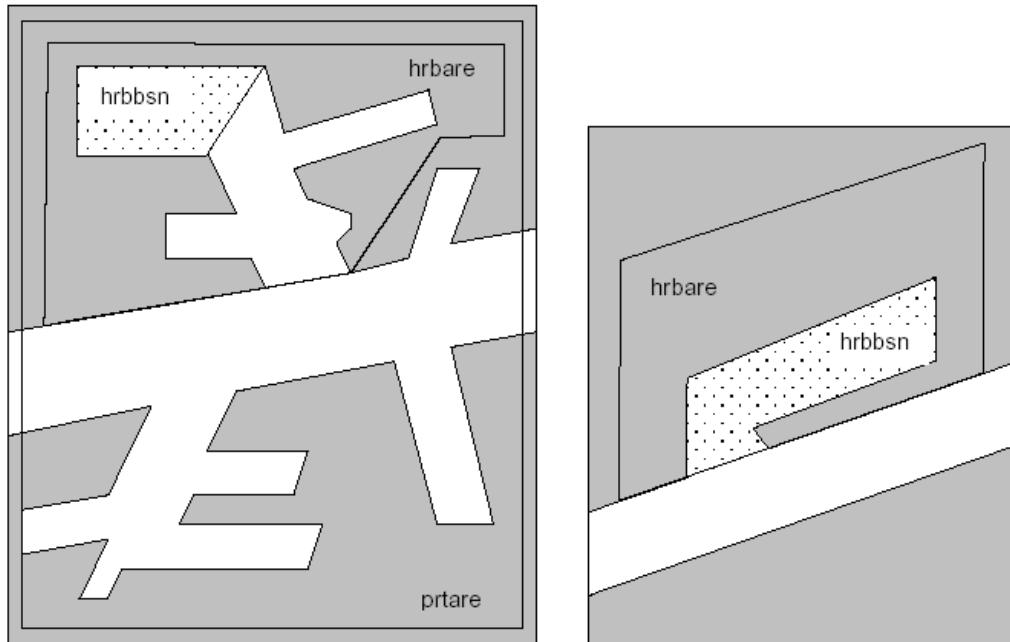
Condition	(CONDTN)	: Under Construction 2 : Ruined : Under Reclamation 5 : Planned Construction	EN	0, 1
Pictorial Representation	(PICREP)		TE	0, 1
interoperability identifier		MRN (see clause 27.161)	URN	0,1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control : Police : Port : Immigration 6 : Health 7 : Coast Guard : Agricultural : Military : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		: Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed : Mariner Report, Not Confirmed : Industry Publications and Reports : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		: default name display 2 : alternate name display	(S) EN	0,1 †
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Collection	Signal Station Aggregation (see clause 25.27)	Signal Station Traffic, Signal Station Warning	Aggregation	0,*
The Updated Object	Updated Information (see clause 25.17)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1

-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.11)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

Inland specific encoding instructions:

- A) A harbour basin is bordered by shoreline constructions and the entrance to the basin.
- B) EUR: If the ISRS Location Code is available it has to be encoded (refer to 2.4.13). If a maritime MRN or RIS-ID is available, the attribute **interoperability identifier** must be encoded (refer to Fehler! V erweisquelle konnte nicht gefunden werden.).
- C) EUR: Harbour Basins must be encoded.



hrbare Harbour Area (see 16.16)

hrbbsn Harbour Basin (this page)

prtare Port Area (see 8.27)

8.26 Lock Basin Part

IHO Definition: A lock basin is divided into several lock basin parts, if this lock basin has one ground level but several gates.

S-401 Geo Feature: Lock Basin Part (lkbspt) (O)

Super Type:

Primitives: surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol

S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Horizontal Clearance Length	(horcll)	[xxx.xx] (metres), e.g., 136.12	RE	1, 1
Horizontal Clearance Width	(horclw)	[xxx.xx] (metres), e.g. 25.17	RE	1, 1
Horizontal Length	(HORLEN)	[xxx.xx] (metres), e.g. 133.22	RE	0, 1
Horizontal Width	(HORWID)	[xxx.xx] (metres), e.g. 133.22	RE	0, 1
UN Location Code	(unlocd)		TE	0, 1
Condition	(CONDTN)	1 : Under Construction 2 : Ruined 3 : Under Reclamation 4 : Wingless 5 : Planned Construction	EN	0, 1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
Scale Minimum	(SCAMIN)	[EUR: 12000; US: 30000] or see clause 2.5.9	IN	1, 1
Fixed Date Range			C	0, 1
Date End	(DATEND)		(S) TD	0, 1

Date Start	(DATSTA)		(S) TD	0, 1
<i>Periodic Date Range</i>			C	0, *
Date End	(DATEEND)		(S) TD	1, 1
Date Start	(DATSTA)		(S) TD	1, 1
Reported Date	(SORDAT)		TD	0, 1
Horizontal Distance Uncertainty	(HORACC)	[xx.xx] (metres), e.g., 1.54	RE	0, 1
Category of Temporal Variation	(CATTEV)	4 : Likely to Change 5 : Unlikely to Change 6 : Unassessed	EN	0, 1
Status	(STATUS)	5 : Periodic/Intermittent	EN	0, 1
<i>Information</i>	(INFORM)		C	0, *
File Locator			(S) TE	0, 1
File Reference	(TXTDSC)		(S) TE	0, 1
Headline			(S) TE	0, 1
Language			(S) TE	1, 1
Text	(INFORM) (NINFOM)		(S) TE	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
interoperability identifier		MRN (see clause 27.161)	URN	0,1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media	(S) EN	0, 1

		14 : Traffic Data		
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

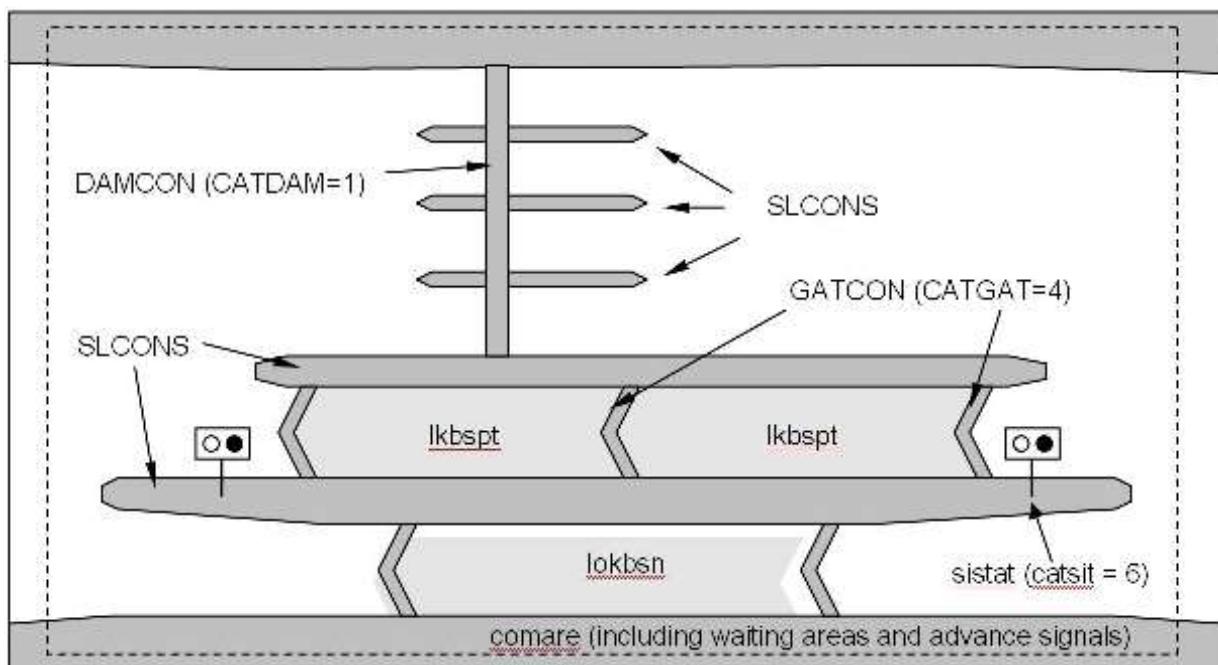
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Component	Lock Aggregation (see clause 25.23)	Lock Basin	Association	0,*
The Component	Barrage Association (see clause 0)	Dam	Association	0,*
The Component	Exceptional Navigation Structure Aggregation (see clause 0)	Exceptional Navigation Structure	Association	0,*
The Updated Object	Updated Information (see clause 25.17)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Non-Standard Working Day, Service Hours, Nautical Information, Time Schedule In General	Association	0,*
-	Spatial Association (see clause 25.11)	Spatial Quality	Association	0,*

† Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

Inland specific encoding instructions:

- If a lock basin has more than two gates and the ground level is the same, different lock basin parts must be created.
- The feature **Lock Basin Part** (lkbspt) must be covered by a **Depth Area** (DEPARE, depare) or **Dredged Area** (DRGARE).
- The usable horizontal clearance of length and width are distances which are provided by the competent authority for safe navigation and must be encoded with **horizontal clearance length (HORCLL)** and **horizontal clearance width (HORCLW)**.
- The physical length and width given by the building itself must be encoded with **horizontal length (HORLEN)** and **horizontal width (HORWID)**
- All features which belong to one lock must be associated to a **Lock Aggregation**.
- EUR: A RIS-ID is assigned to each single **Lock Basin Part** (lkbspt) and **lock basin** (lokbsn) feature and to the **Nautical Information** feature associated with the entire lock (refer to 2.4.13 and **Fehler! Verweisquelle konnte nicht gefunden werden.**).
- If the lock basin part has a special time schedule or special operating hours apply, the feature can be combined with a time schedule. For this purpose please refer to the **Time Schedule – In General** feature (tisdge) (24.6)

- H) If a structured external XML-file with more detailed communication information is available, the reference to the file has to be entered in the **file reference** (TXTDSC) attribute.



comare Communication Area (see 22.13)

DAMCON Dam (see 8.12)

CATDAM category of dam (see 27.35)

GATCON Gate (see 8.11)

CATGAT category of gate (see 27.47)

Ikbspt Lock Basin Part (this page)

lokbsn Lock Basin (see 8.22)

sistat Traffic Signal Station (see 22.5)

catsit category of signal station, traffic (see 27.86)

SLCONS Shoreline Construction (see 8.6)

8.27 Port Area

IHO Definition: Apart from harbours a port includes a city or borough with accommodation and facilities for landing passengers and goods and some amount of overseas trade. A port may possess a harbour but a harbour is not necessarily a port.

S-401 Geo Feature: Port Area (prtare) (C)

Super Type:

Primitives: surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol

S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
UN Location Code	(unlocd)		TE	0, 1
Condition	(CONDTN)	1 : Under Construction 2 : Ruined 5 : Planned Construction	EN	0, 1
feature name		See clause 2.5.8	C	0, *
language		ISO 639-2/T	(S) TE	1, 1
name	(OBJNAM) (NOBJNM)		(S) TE	1, 1
name usage		1 : default name display 2 : alternate name display	(S) EN	0, 1 [†]
Fixed Date Range			C	0, 1
Date End	(DATEND)		(S) TD	0, 1
Date Start	(DATSTA)		(S) TD	0, 1
Periodic Date Range			C	0, *
Date End	(DATEND)		(S) TD	1, 1
Date Start	(DATSTA)		(S) TD	1, 1
Reported Date	(SORDAT)		TD	0, 1
Status	(STATUS)	5 : Periodic/Intermittent	EN	0, 1
Scale Minimum	(SCAMIN)	[45000] or see clause 2.5.9	IN	1, 1
Information	(INFORM)		C	0, *
File Locator			(S) TE	0, 1
File Reference	(TXTDSC)		(S) TE	0, 1
Headline			(S) TE	0, 1
Language			(S) TE	1, 1

Text	(INFORM) (NINFOM)		(S) TE	0, 1
Pictorial Representation	(PICREP)		TE	0, 1
interoperability identifier		MRN (see clause 27.161)	URN	0,1
In Dispute			BO	0, 1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

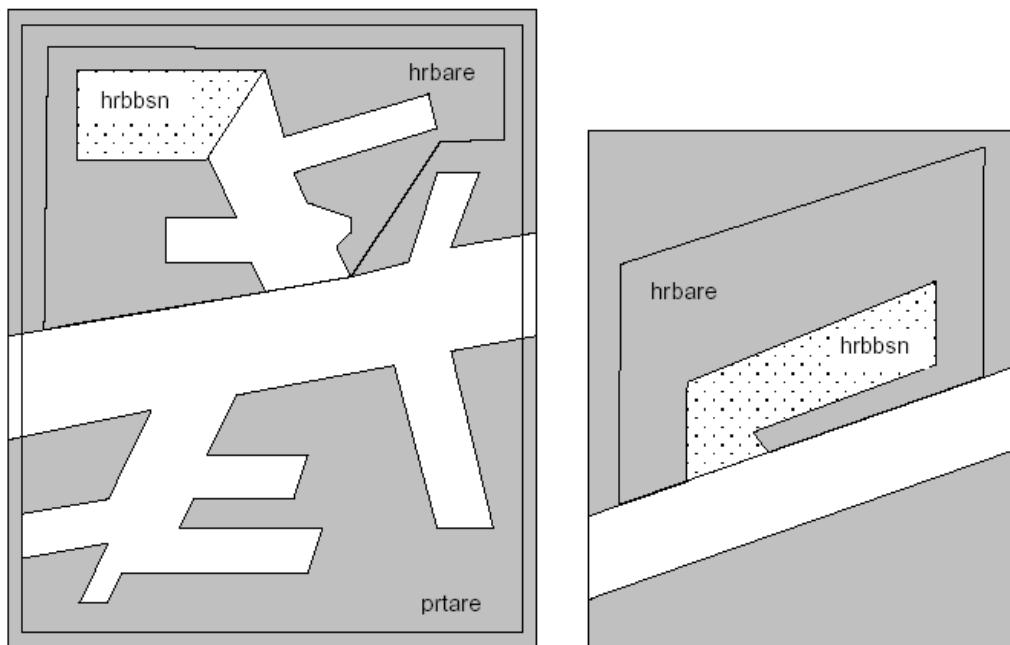
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.17)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1

-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.11)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

Inland specific encoding instructions:

- A) The port area covers the entire area of a city's harbor areas, harbor basins, terminals and harbor facilities.
- B) Normally it applies only to big international ports.
- C) A port may possess a harbor but a harbor is not necessarily a port.
- D) If a structured external XML-file with more detailed communication information is available, the reference to the file has to be entered in the **file reference** (TXTDSC) attribute.
- E) If the ISRS Location Code is needed for Application Specific Messages via AIS it has to be encoded (refer to 2.4.13). If a maritime MRN or RIS-ID is available, the attribute **interoperability identifier** must be encoded (refer to **Fehler! Verweisquelle konnte nicht gefunden werden.**).
- F) EUR: Port Areas must be encoded.



hrbare Harbour Area (see 16.16)

hrbbsn Harbour Basin (this page)

prtare Port Area (see 8.27)

9 Geo Features – Topographic Terms

9.1 Sea area/named water area

IHO Definition: **SEA AREA/NAMED WATER AREA.** A geographically defined part of the sea or other navigable waters. It may be specified within its limits by its proper name. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.151, November 2000).

S-401 Geo Feature: Sea Area/Named Water Area (SEAARE) (O)

Primitives: Point, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of sea area	(CATSEA)	2 : gat 3 : bank 4 : deep 5 : bay 6 : trench 7 : basin 8 : mud flats 9 : reef 10 : ledge 11 : canyon 12 : narrows 13 : shoal 14 : knoll 15 : ridge 16 : seamount 17 : pinnacle 18 : abyssal plain 19 : plateau 20 : spur 21 : shelf 22 : trough 23 : saddle 24 : abyssal hill 25 : apron 26 : archipelagic apron 27 : borderland 28 : continental margin 29 : continental rise 30 : escarpment 31 : fan 32 : fracture zone 33 : gap 34 : guyot 35 : hill 36 : hole	EN	0,1 †

		37 : levee 38 : median valley 39 : moat 40 : mountains 41 : peak 42 : province 43 : rise 44 : sea channel 45 : seamount chain 46 : shelf-edge 47 : sill 48 : slope 49 : terrace 50 : valley 51 : canal 52 : lake 53 : river 54 : reach 55 : intertidal cay 56 : submarine volcano 57 : Chute 58 : Backwater/Slough 59 : Bend		
feature name		See clause 2.5.8	C	1,* †
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
scale minimum	(SCAMIN)	[EUR: 45000, US: 60000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
<i>Category of Temporal Variation</i>	(CATTEV)	4 : Likely to Change 5 : Unlikely to Change 6 : Unassessed	EN	0, 1
Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural	(S) EN	0, 1

		9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0, *
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0, *
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0, *
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0, *

[†] At least one of the attributes **category of sea area** or **feature name** must be populated.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

9.1.1 Sea areas

Undersea features and sea areas in general, including intertidal areas, may be identified by their names and may be delimited by the spatial types used by other geo features (for example depth

contours, coastlines). If it is required to encode these areas, this must be done using the feature **Sea Area/Named Water Area**.

Remarks:

- This feature has a use similar to that of the feature **Land Region** (see clause 5.8), but for the sea.
- A **Sea Area/Named Water Area** feature of type surface should be bounded, if possible, by existing curves used by other features (for example **Depth Contour**, **Coastline**). If necessary, however, this surface may be bounded by other curves created to close the surface, or to describe a new surface.
- **Sea Area/Named Water Area** features of type surface may overlap.
- Inactive submarine volcanos must be encoded, if required, as **Sea Area** with **category of sea area** = 56 (submarine volcano). Active submarine volcanos must be encoded, if required, using an **Obstruction** feature (see clause 13.6).
- For additional guidance on encoding geographic names, see clause 2.5.8.

Distinction: Administration Area; Depth Area; Seabed Area.

Inland specific Encoding Instructions:

- A) For river or canal names, place the point feature at or near confluences where a label is needed to distinguish adjoining waterways.
- B) A surface feature may be used if its usage will aid in reducing clutter.
- C) **Sea Area / Named Water Area** (SEAARE) surface is mandatory only at confluences of two waterways up to 2 kilometres from the confluence.
- D) Use **Sea Area / Named Water Area** (SEAARE) (P) to display the name only at the location where the point was placed. A point feature should be used if the point is always on the display when it is relevant. Use **Sea Area / Named Water Area** (SEAARE) (S) if display of name is desired along water area's entire expanse.
- E) Federal Mooring Facility
 - i) Create **Sea Area / Named Water Area** (SEAARE) (P) with **feature name** (OBJNAM) = "Federal Mooring Cell(s) / Buoy(s) / Block(s)"
 - ii) Only one **Sea Area / Named Water Area** (SEAARE) should be located at each **Dolphin, Bollard or Mooring Buoy** (MORFAC) or set of MORFACs
- F) Lock Name
 - i) US & RU: The **Sea Area / Named Water Area** (SEAARE) feature must overlay the **Depth Area** (DEPARE, depare) feature representing lock chamber. **Feature name** (OBJNAM) shall be the commonly known name of the Lock or Lock & Dam.
 - ii) EUR: The name should be encoded in the **Nautical Information** feature (see clause 24.4)
- G) Sailing Line / Recommended Track: US: A second sailing line should be used only if needed for routing through an alternate lock, or around a lock, if warranted. Primary and secondary sailing line must be distinguished with **information** (INFORM) attribute, and use of **Sea Area / Named Water Area** (SEAARE) feature for labeling.
- H) **Anchorage Area:** If the name of the anchorage is important for navigation and should be displayed without the use of the pick report, use **Sea Area / Named Water Area** (SEAARE) feature additional.
- I) US: Any important navigation notes that should always be shown on the IENC should be encoded as **Land Region** (LNDRGN) (P) on land or **Sea Area / Named Water Area** (SEAARE) (P) features in the water.

10 Geo Features – Tides, Currents

10.1 Tidal data

The inclusion of tidal information in Inland ECDIS or ECS is optional. As such, for IENC only tidal stream and current information is required to be encoded. The implementation of tidal models based on predictions or applications to incorporate real-time tidal observations in Inland ECDIS or ECS will be the subject of additional Product Specifications utilising the S-100 Universal Hydrographic Data Model.

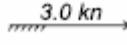
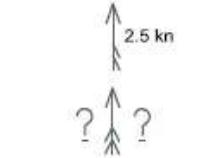
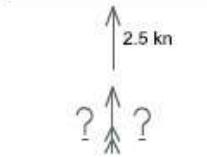
10.2 Tidal stream – flood/ebb

IHO Definition: **TIDAL STREAM.** Approximate tidal stream rates given as discrete rate values for flood and ebb flow during springs. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.173, November 2000).

For IENCs the alternating horizontal movement of water associated with the rise and fall of the tide caused by tide-producing forces. Also called tidal current.

S-401 Geo Feature: Tidal Stream – Flood/Ebb (TS_FEB) (O)

Primitives: Point, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol
		 Flood stream, rate at spring tides  Current or tidal stream whose direction is not known <hr/>  Boundary of an area for which there is tidal information
		 Ebb stream, rate at spring tides  Current or tidal stream whose direction is not known <hr/>  Boundary of an area for which there is tidal information

S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of tidal stream	(CAT_TS)	1 : flood stream 2 : ebb stream 3 : other tidal flow	EN	1,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		2 : default name display 2 : alternate name display	(S) EN	0,1 [†]
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
interoperability identifier		MRN (see clause 27.161)	URN	0,1
orientation			C	0,1

orientation uncertainty			(S) RE	0,1
orientation value	(ORIENT)	[xxx.xx or "unknown"] (degree (°)), e.g., 110.76	(S) RE	1,1
speed			C	1,1
speed maximum	(CURVEL)	65.0 >= speed maximum > speed minimum [xx.x]	(S) RE	1,1
speed minimum		0 < speed minimum < speed maximum	(S) RE	0,1
scale minimum	(SCAMIN)	[22000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFOM)		(S) TE	0,1 †
speed units		3 : metres per second 2 : kilometres per hour 4 : miles per hour 4 : knots	(S) EN	1,1
Periodic Date Range			C	0, *
Date End	(DATEND)		(S) TD	1, 1
Date Start	(DATSTA)		(S) TD	1, 1
Reported Date	(SORDAT)		TD	0, 1
Pictorial Representation	(PICREP)		TE	0, 1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 5 : Police 6 : Port 7 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 8 : Private Company 9 : Maritime Police 10 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1

Source Type		11 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 12 : Remotely Sensed Images 13 : Photographs 14 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		15 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

† Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

10.2.1 Tidal stream (flood/ebb)

The term “tidal streams” (French: “courants de marée”, US usage: “tidal currents”), is used to designate the periodical horizontal movements of the water, which are astronomical in origin. These are distinguished from “currents” (French: “courants généraux”), which are not dependent on

astronomical conditions. In practice the boatmaster experiences a combination of tidal stream and current. Tidal streams are defined by the direction towards which they flow. The terms "flood stream" and "ebb stream" are used for designating the horizontal movement of the water when the tide is respectively rising or falling. To avoid any ambiguity, in the case of streams which do not turn at about the time of local high or low water, an indication must be given of the direction towards which the stream flows.

Where data are inadequate for tabulated information (**Tidal Stream Panel Data** – see clause 10.5), or where otherwise required, single observations comprising flood and ebb directions and/or rates, preferably corresponding to maximum rates at the spring tide, should be encoded.

If it is required to encode tidal stream information that is limited to flood and ebb directions and/or values, it must be done using the feature **Tidal Stream – Flood/Ebb**.

Remarks:

- Maximum directions and rates (velocities) of tidal streams during springs, where known, must be encoded in knots or km/h using the complex attributes **orientation** and **speed**, and should be quoted to one decimal place. In rivers and estuaries where there are permanent currents caused by the flow of river water, such currents must be included in the calculation of the rate. Where the speed of the current in a river or estuary is so variable as to make it impractical to indicate a value, **speed** (sub-attribute **speed maximum**) should be populated with an empty (null) value.

Distinction: Current – Non-Gravitational; Tidal Stream Panel Data.

Inland specific Encoding Instructions:

10.3 Current – non-gravitational

IHO Definition: **CURRENT – NON-GRAVITATIONAL.** Any current that is caused by other than tide producing forces. (IHO Dictionary – S-32).

For IENCs **Current** is preferably indicated at high and low water conditions to aid with planning, navigation and maneuvering.

S-401 Geo Feature: Current – Non-Gravitational (current) (O)

Primitives: Point, Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
				
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
<i>feature name</i>		See clause 2.5.8	C	0,*
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 †
<i>fixed date range</i>		See clause 2.4.8	C	0,1
<i>date end</i>	(DATEND)		(S) TD	0,1 †
<i>date start</i>	(DATSTA)		(S) TD	0,1 †
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>orientation</i>			C	1,1
<i>orientation uncertainty</i>			(S) RE	0,1
<i>orientation value</i>	(ORIENT)	[xxx.xx or "unknown"] (degree (°)), e.g., 110.76	(S) RE	1,1
<i>periodic date range</i>		See clause 2.4.8	C	0,*
<i>date end</i>	(PEREND)		(S) TD	1,1
<i>date start</i>	(PERSTA)		(S) TD	1,1
<i>speed</i>			C	0,1
<i>speed maximum</i>	(CURVEL)	65.0 >= speed maximum > speed minimum	(S) RE	1,1
<i>speed minimum</i>		0 < speed minimum < speed maximum	(S) RE	0,1

<i>status</i>	(STATUS)	5 : periodic/intermittent	EN	0,1
scale minimum	(SCAMIN)	[18000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
Direction of Impact	(dirimp)	1 : Upstream 2 : Downstream 3 : To the Left Bank 4 : To the Right Bank	EN	0, *
speed units		1 : metres per second 2 : kilometres per hour 3 : miles per hour 4 : knots	(S) EN	1,1
Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Current Velocity at High Water Level	(curvhw)	[xx.x]	RE	0, 1
Current Velocity at Low Water Level	(curvlw)	[xx.x]	RE	0, 1
Current Velocity at Mean Water Level	(curvmw)	[xx.x]	RE	0, 1
Current Velocity at Other Water Level	(curvow)	[xx.x]	RE	0, 1
Name of Relevant High Water Level	(hignam)		TE	0, 1
Name of Relevant Low Water Level	(lownam)		TE	0, 1
Name of Relevant Mean Water Level	(meanam)		TE	0, 1
Name of Other Locally Relevant Water Level	(othnam)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime	(S) EN	0, 1

		16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.125.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

† Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

10.3.1 Current data

The term “current(s)” in this document is used to describe water movements which are generally constant in direction, and are not dependent on astronomical conditions (that is, are non-gravitational). A current is described by the direction towards which it is running. For tidal streams, see clauses 10.2 and 10.5.

Currents occur as:

- The flow of river water in rivers and estuaries;
- Permanent flows in other restricted waters, for example İstanbul Boğazı (Bosphorus);
- Permanent or seasonal oceanic currents;
- Temporary wind-induced currents.

It is particularly important to depict currents (both the main flows and permanent eddies) which could set a vessel towards dangers.

If it is required to encode a non-gravitational current, it must be done using the feature **Current – NonGravitational**.

Remarks:

- Maximum rates (velocities) of currents, where known, must be encoded in knots using the complex attributes **orientation** and **speed**, and should be quoted to one decimal place. Ideally, the minimum and maximum strengths should be quoted, where known, if the strength varies.
- In tidal waters where the flow of river water alternately reinforces the ebb tidal stream and reduces the flood, the combined effect must be encoded, where required, for the convenience of the navigator; that is, the combined current must be encoded using the features **Tidal Stream – Flood/Ebb** or **Tidal Stream Panel Data** (see clauses 10.2 and 10.5). In restricted waters where tides are negligible, the direction and/or rate of flow should be encoded using **Current – Non-Gravitational**.
- Ocean currents are permanent or seasonal, are somewhat variable in strength and direction, and generally cover broad areas. In cases where the current strength and direction are subject to seasonal variations, this should be indicated using the complex attribute **periodic date range**. This may require multiple **Current – Non-Gravitational** features with attributes populated in accordance with the seasonal variations to be coincident in the IENC. Where the direction of a current is so variable that it is not practicable to show this information, the complex attribute **orientation (orientation value)** must be populated with an empty (null) value.
- Local weather conditions can produce significant temporary wind-induced currents which cannot be charted. If there is a known hazard, for example if winds from a particular direction have been found to endanger vessels by setting them on to shoals unexpectedly, a cautionary note may be added using the feature **Caution Area** (see clause 16.11). If considered necessary, the note may refer to further information in other publications, such as Sailing Directions.

Distinction: Tidal Stream (Flood/Ebb); Tidal Stream Panel Data.

Inland specific Encoding Instructions:

- A) Code **Current** as a surface when information applies to a larger portion of water and provide average current values (xx.x km/h) for and name of the water level(s) for which information is available.
- B) Code **Current** (current) as a point feature if information is based on local measurements.
- C) Provide direction of impact if **Current** (current) is coded as surface feature. Provide **orientation value (ORIENT)** (360°) if **Current** (current) is coded as point feature.
- D) Provide values for current velocity in km/h:
 - **current velocity at high water level** (curvhw)
 - **current velocity at low water level** (curvlw)
 - **current velocity at mean water level** (curvmw)
 - **current velocity at other water level** (curvow)
- E) State names of water levels for which current value is provided including version identification, for example year of issue or period:
 - **name of relevant high water level** (hignam)
 - **name of relevant low water level** (lownam)
 - **name of relevant mean water level** (meanam)
 - **name of other locally relevant water level** (othnam)



10.4 Water turbulence

IHO Definition: **WATER TURBULENCE.** The disturbance of water caused by the interaction of any combination of waves, currents, tidal streams, wind, shoal patches and obstructions. (IHO Dictionary – S-32).

S-401 Geo Feature: Water Turbulence (WATTUR) (O)

Primitives: Point, Curve, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol			
S-401 Attribute		S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of water turbulence		(CATWAT)	1 : breakers 2 : eddies 3 : overfalls 4 : tide rips 5 : bombora 6 : Under Water Turbulence	EN	1,1
feature name			See clause 2.5.8	C	0,*
language			ISO 639-2/T	(S) TE	1,1
name		(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage			1 : default name display 2 : alternate name display	(S) EN	0,1 †
interoperability identifier			MRN (see clause 27.161)	URN	0,1
scale minimum		(SCAMIN)	[22000] or see clause 2.5.9	IN	1,1
information			See clause 2.4.6	C	0,*
file locator				(S) TE	0,1
file reference		(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline				(S) TE	0,1
language			ISO 639-2/T	(S) TE	1,1
text		(INFORM) (NINFOM)		(S) TE	0,1 †
Reported Date		(SORDAT)		TD	0, 1
Pictorial Representation		(PICREP)		TE	0, 1

Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

† Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

10.4.1 Overfalls, races, breakers, eddies

If it is required to encode a disturbance of water, it must be done using the feature **Water Turbulence**.

Remarks:

- If it is required to encode a breaker over an off-lying shoal, it must be done using a **Water Turbulence** feature at the same position as the feature causing the breaker (for example **Underwater/Awash Rock**).
- A **Water Turbulence** feature of type surface must be covered by **Depth Area**, **Dredged Area** or **Unsurveyed Area** features as appropriate.

Distinction:

Inland specific Encoding Instructions:

- A) Water power supplies are producing **Water Turbulences** under water at a place where the vessels enter the locks.

10.5 Tidal stream panel data

IHO Definition: **TIDAL STREAM PANEL DATA.** Approximate tidal stream characteristics given as discrete value sets at a specified interval before and/or after a high or low water. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.176, November 2000).

S-401 Geo Feature: Tidal Stream Panel Data (TS_PAD) (O)

Primitives: Point, Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
station name	(TS_TSP)		TE	1,1
station number	(TS_TSP)		TE	0,1
tidal stream panel values	(TS_TSP)		C	1,* (ordered)
reference tide		1 : high water 2 : low water	(S) EN	1,1
reference tide type		1 : springs 2 : neaps 3 : mean	(S) EN	1,1
stream depth			(S) RE	0,1
tidal stream value			(S) C	1,* (ordered)
orientation			(S) C	1,1
orientation uncertainty			(S) RE	0,1
orientation value			(S) RE	1,1
speed maximum		65.0 >= speed maximum	(S) RE	1,1
time relative to tide			(S) RE	1,1
scale minimum	(SCAMIN)	[22000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1

text	(INFORM) (NINFORM)		(S) TE	0,1 †
speed units		1 : metres per second 2 : kilometres per hour 3 : miles per hour 4 : knots	(S) EN	1,1
Reported Date	(SORDAT)		TD	0, 1
Pictorial Representation	(PICREP)		TE	0, 1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1

	Additional Information (see clause 25.1)	Nautical Information	Association	0, *
	Spatial Association (see clause 25.10)	Spatial Quality	Association	0, *

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

10.5.1 Tidal stream panels

The term “tidal streams” (French: “courants de marée”, US usage: “tidal currents”), is used to designate the periodical horizontal movements of the water, which are astronomical in origin. These are distinguished from “currents” (French: “courants généraux”), which are not dependent on astronomical conditions. In practice the navigator experiences a combination of tidal stream and current. Tidal streams are defined by the direction towards which they flow. The terms “flood stream” and “ebb stream” are used for designating the horizontal movement of the water when the tide is respectively rising or falling. To avoid any ambiguity, in the case of streams which do not turn at about the time of local high or low water, an indication must be given of the direction towards which the stream flows.

If it is required to encode the information generally shown on paper charts as a tidal stream panel and stations, it must be done using the feature **Tidal Stream Panel Data**.

Tidal stream values encoded in this way should be spring rates; that is, the tidal stream rates associated with a tidal range which is defined as the difference in height between MHWS and MLWS.

Remarks:

- The mandatory complex attribute **tidal stream panel values** is structured such that, in combination with attributes **station name** and **station number**, the equivalent layout of a paper chart tidal stream panel can be reproduced in an Inland ECDIS or ECS Pick Report display. An example of the encoding of a **Tidal Stream Panel Data** feature as compared to the S-57 object class **TS_PAD** is included below:

S-57 Encoding: Population of attribute TS_TSP

0014,PLYMOUTH (DEVONPORT),HW,113,0.1,332,0.6,331,1.1,342,1.0,347,0.7,333,0.5,317,0.3,178,0.3,146,0.6,140,1.0,143,1.1,143,
0.8,138,0.3

S-401 Encoding: (Complex attributes in italics, encoded values in blue text)

Tidal Stream Panel Data (feature)		
station name	Plymouth (Devonport)	
station number	0014	
<i>tidal stream panel values</i>		
reference tide	high water	
reference tide type	springs	
<i>tidal stream value</i>	orientation	orientation value
	113	
	speed maximum	
<i>tidal stream value</i>	0.1	
	time relative to tide	
	-6	
<i>tidal stream value</i>	orientation	orientation value
	332	
	speed maximum	
<i>tidal stream value</i>	0.6	
	time relative to tide	
	-5	
<i>tidal stream value</i>	orientation	orientation value
	331	

		speed maximum	1.1
		time relative to tide	-4
<i>tidal stream value</i>	<i>orientation</i>	orientation value	342
		speed maximum	1.0
		time relative to tide	-3
<i>tidal stream value</i>	<i>orientation</i>	orientation value	347
		speed maximum	0.7
		time relative to tide	-2
<i>tidal stream value</i>	<i>orientation</i>	orientation value	333
		speed maximum	0.5
		time relative to tide	-1
<i>tidal stream value</i>	<i>orientation</i>	orientation value	317
		speed maximum	0.3
		time relative to tide	0
<i>tidal stream value</i>	<i>orientation</i>	orientation value	178
		speed maximum	0.3
		time relative to tide	1
<i>tidal stream value</i>	<i>orientation</i>	orientation value	146
		speed maximum	0.6
		time relative to tide	2
<i>tidal stream value</i>	<i>orientation</i>	orientation value	140
		speed maximum	1.0
		time relative to tide	3
<i>tidal stream value</i>	<i>orientation</i>	orientation value	143
		speed maximum	1.1
		time relative to tide	4
<i>tidal stream value</i>	<i>orientation</i>	orientation value	143
		speed maximum	0.8
		time relative to tide	5
<i>tidal stream value</i>	<i>orientation</i>	orientation value	138
		speed maximum	0.3
		time relative to tide	6

Table 10-1 – Tide Stream Panel Data - Example

- Where an encoded complex attribute **tidal stream value**, sub-attribute **speed maximum** has a value of zero (indicating slack water), the corresponding sub-attribute **orientation / orientation value** must be populated with an empty (null) value.

Distinction: Current – Non-Gravitational; Tidal Stream – Flood/Ebb.

Inland specific Encoding Instructions:

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11 Geo Features – Depths

11.1 Generalisation of depth portrayal

When a survey or chart is reduced in scale the generalization that is required has several effects:

- a. Deeper soundings tend to be eliminated while the shoaler ones are retained for safety. Sufficient numbers of deeper soundings should be retained to show the full range of depth. This is to assist the boatmaster who uses their echo sounder to help verify their position, or the boatmaster choosing an anchorage of suitable depth.
- b. Generalization proceeds by the inclusion of shoals lying to seaward of the principal contour, and by the smoothing of severely indented contours, with the effect of pushing the contours seaward. However, as a shoal which rises steeply from deep water is much more of a hazard than one which rises gradually, the encoder must ensure that the contours are not pushed seaward unduly. If the encoder gives the impression that a boatmaster will get warning of too close an approach to the danger, by relying on their echo sounder to show gradually shoaling depth - when the danger is, in fact "steep-to" - they may seriously mislead and endanger the IENC user.
- c. With the "expansion" of shoals, described above, it may become increasingly difficult to find space on an IENC dataset to show the line of deepest soundings through a channel, or even to show a channel at all. Yet even at small optimum display scales it is important to show the usable channels and indicate their least depth. The encoder may have to make greater use of depth contours than soundings in depicting narrow channels.
- d. Even such dangers as drying rocks and islets require generalization in coastal areas. This is in recognition of the principle that, whereas they are particularly dangerous in isolation and must then be shown as precisely as possible, where they occur in groups a representative depiction is permissible, showing the outermost features as individually as space permits.

11.2 Representation of depth: General

Some of the principles of depth depiction are summarized below:

- a. The least depth over shoals and banks, and over sills (bars) in navigable channels, must be shown. Particular attention should also be paid to full and accurate representation of all other "critical" areas, for example on and adjacent to leading lines, controlling depths in fairways and along recommended tracks, in anchorages, alongside jetties, quays and berths and in the entrances to harbours and basins. Maximum as well as minimum depth should be shown where possible, for example to show the line of deepest water in narrow channels. However, deeper soundings on the sloping side of a bank near to the crest line should not be selected if they could give the impression that there is a deeper passage across the crest between shoaler soundings.
- b. Soundings and contours must be used to complement each other in giving a reasonable representation of the seabed, including all significant breaks of slope.
- c. The density of soundings should be determined by the type of seabed. Flat or evenly sloping areas, and banks of unconsolidated sediment, should have a minimum of soundings, fairly evenly spaced, but gradually becoming more widely spaced as the depth increases. Irregular seabed topography should be represented by a denser, and probably irregular, pattern of soundings. A steep gradient should be represented by close contours, undistorted by soundings.
- d. In changeable areas, where surveys of different dates adjoin and do not match exactly, gaps in the contours may be left to indicate the discontinuity of depth to the boatmaster.

- e. Where practicable, soundings on smaller optimum display scale IENCs should be selected from those shown on the larger optimum display scale IENCs.
- f. In areas navigable only at high water, drying heights must be selected according to the same principles as soundings.
- g. Where surveys are inadequate, it may be advisable to omit some of the standard contour lines.

11.3 Sounding

IHO Definition: **SOUNDING**. Measured or charted depth of water (may be a drying height), or the measurement of such a depth, which has been reduced to a vertical datum. (Adapted from IHO Dictionary – S32).

S-401 Geo Feature: Sounding (SOUNDG) (O)

Primitives: Pointset

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>

S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
<i>feature name</i>		See clause 2.5.8	C	0,*
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 †
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>quality of vertical measurement</i>	(QUASOU)	1 : depth known 3 : doubtful sounding 4 : unreliable sounding 8 : value reported (not surveyed) 9 : value reported (not confirmed)	EN	0,*
<i>reported date</i>	(SORDAT)	See clause 2.4.8	TD	0,1
<i>status</i>	(STATUS)	18 : existence doubtful	EN	0,1
<i>technique of vertical measurement</i>	(TECSOU)	1 : found by echo sounder 2 : found by side scan sonar 3 : found by multi beam 4 : found by diver 5 : found by lead line 6 : found by wire drag 8 : swept by vertical acoustic system 9 : found by electromagnetic sensor 10 : photogrammetry 11 : satellite imagery 12 : found by levelling	EN	0,*

		13 : swept by side scan sonar 15 : found by LIDAR 16 : synthetic aperture radar 17 : hyperspectral imagery 18 : mechanically swept		
scale minimum	(SCAMIN)	Compilation scale multiplied by 2 or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	1,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
Sounding Accuracy	(SOUACC)	[x.xx] The best estimate of the accuracy of the sounding data. Minimum value: 0; Resolution: 0.01 m	RE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *

<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

11.3.1 Soundings

A sounding associated with a rock or coral pinnacle which is an obstruction to navigation must be encoded using the feature **Underwater/Awash Rock** with attribute **value of sounding** populated with the value of the sounding.

The geometry of soundings is held in a 3-dimensional array (latitude, longitude, depth). In the interests of efficiency, multiple soundings should be encoded in one spatial type (known as “grouping” of soundings), provided that all the spatial and geo feature attributes are common to the group and all soundings in the group are related to the same sounding datum (see clause 3.9).

As the sounding multiplication factor (CMFZ) for IENC is 10, soundings may be encoded to one decimal place of a metre. Drying soundings must be indicated by a negative value. For soundings surrounded by a danger line, see clauses 13.1 and 13.2.

Population of the attributes **quality of vertical measurement**, **reported date** and the spatial attribute **quality of horizontal measurement** are described in the Table below:

Sounding	quality of horizontal measurement	quality of vertical measurement	Remarks
In true position		1 or <undefined>	
Out of position on paper chart		1 or <undefined>	Spatial type must be encoded at the true position. There is no “sounding, out of position” in an IENC.
Lower reliability	4	4	

Drying		1 or <undefined>	Negative value
Doubtful		3	Existence doubtful should be encoded using status = 18
Reported but not confirmed	4	9	If available, the year of report must be encoded using the attribute reported date

Table 11-1 – Soundings – Attribute encoding**Remarks:**

- Encoders are advised to use caution when considering encoding soundings that are shoaler than the range of depth of the surrounding depth area, as **Sounding** features will not be displayed when utilising some Inland ECDIS or ECS display settings. Where it is considered that a sounding that is shoaler than the range of depth of the surrounding depth area may be a hazard to navigation, encoders should preferably conduct further investigation of source material in order to encode additional depth contour and depth area information more relevant to the sounding. Alternatively, encoders may consider using an alternate feature (for example **Obstruction**) to encode the depth.
- The attribute **technique of vertical measurement** must only be populated for **Sounding** features if it is different from the value of **technique of vertical measurement** encoded on an overlapping **Quality of Survey** feature (see clause 3.11); and the information is considered to be important to navigation.
- Where **Sounding** features are covered by the Meta feature **Quality of Survey**, the attribute **quality of vertical measurement** must not be populated unless different from the value of **quality of vertical measurement** populated for the **Quality of Survey**.
- An instance of the information type **Spatial Quality** (see clause 24.5.1) may be associated to the sounding geometry, using the association **Spatial Association** to indicate, where required, that the horizontal position and/or the vertical uncertainty for the sounding(s) is of different (higher or lower) accuracy than indicated by the underlying **Quality of Bathymetric Data** Meta feature (see clause 3.8). See also clause 3.8.1.3 (Sounding uncertainty).
- Where a named isolated shoal is indicated in the dataset by a single encoded sounding, the name of the shoal must be encoded, where required, using the complex attribute **feature name** on the **Sounding** feature. Where the named isolated shoal is indicated by two or more soundings (and possibly other submerged features), the name of the shoal must be encoded, where required, using a **Sea Area/Named Water Area** feature (see clauses 2.5.8 and 9.1).
- Encoders must exercise caution when using the option to group soundings; particularly where they are included in an IENC Update as this may impact negatively on Inland ECDIS or ECS performance regarding boatmaster interrogation of Updates. When grouping soundings in an IENC dataset, creation of excessively large sounding groups should be avoided so as to reduce the impact when a sounding is to be removed by IENC Update; and new soundings to be added by IENC Update should not be added to already existing sounding groups.

Distinction: Depth Area; Obstruction; Underwater/Awash Rock; Wreck.

Inland specific Encoding Instructions:

- A) **Soundings** should be used sparingly in IENC, especially on rivers and canals. On rivers and canals only in rare cases where such information is of vital interest to boatmasters and no other encoding seems to be possible (like e.g. wrecks or obstructions to navigation) soundings may be used. This might be in case of isolated rocks below low water level.
- B) **Soundings** shall always be referred to the same water level as the surrounding depth information.

11.4 Dredged area

IHO Definition: **DREDGED AREA.** An area of the bottom of a body of water which has been deepened by dredging. (IHO Dictionary – S-32).

S-401 Geo Feature: Dredged Area (DRGARE) (C)

Primitives: Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
<i>depth range maximum value</i>	(DRVVAL2)	DRVVAL2 >= DRVVAL1	RE	0,1
<i>depth range minimum value</i>	(DRVVAL1)	DRVVAL1 <= DRVVAL2 [x.xx] (metres), e.g., 2.74 or "unknown"	RE	1,1
<i>dredged date</i>	(SORDAT)		TD	0,1
<i>feature name</i>		See clause 2.5.8	C	0,*
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 †
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>maximum permitted draught</i>			RE	0,1
<i>quality of vertical measurement</i>	(QUASOU)	10 : maintained depth 11 : not regularly maintained	EN	0,1
<i>restriction</i>	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 8 : entry restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited	EN	0,*

		19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 23 : cargo transhipment (lightening) prohibited 25 : stopping prohibited 27 : speed restricted 28 : Overtaking Prohibited 29 : Overtaking of Convoys by Convoys Prohibited 30 : Passing or Overtaking Prohibited 31 : Berthing Prohibited 32 : Berthing Restricted 33 : Making Fast Prohibited 34 : Making Fast Restricted 35 : Turning Prohibited 36 : Restricted Fairway Depth 37 : Restricted Fairway Width 38 : Use of Spuds Prohibited 39 : swimming prohibited 40 : SOx Emission Restricted 41 : NOx Emission Restricted 43 : Passing or Overtaking of Convoys by Convoys Prohibited		
<i>technique of vertical measurement</i>	(TECSOU)	1 : found by echo sounder 2 : found by side scan sonar 3 : found by multi beam 6 : swept by wire drag 8 : swept by vertical acoustic system 9 : found by electromagnetic sensor 13 : swept by side scan sonar 15 : found by LIDAR 16 : synthetic aperture radar 17 : hyperspectral imagery 18 : mechanically swept	EN	0,*
<i>vertical uncertainty</i>	(SOUACC) (VERACC)		C	0,1
uncertainty fixed		[xx.xx] (metres), e.g., 1.54	(S) RE	1,1
uncertainty variable factor			(S) RE	0,1
<i>vessel speed limit</i>			C	0,*
speed limit			(S) RE	1,1
speed units		2 : kilometres per hour 3 : miles per hour 4 : knots	(S) EN	1,1
vessel class			(S) TE	0,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1

language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 [†]
Category of Temporal Variation	(CATTEV)	4 : Likely to Change 5 : Unlikely to Change 6 : Unassessed	EN	0, 1
Reported Date	(SORDAT)		TD	0, 1
Pictorial Representation	(PICREP)		TE	0, 1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Auxiliary Feature	Fairway Auxiliary (see clause 25.6)	Fairway	Association	0,*

The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

11.4.1 Dredged areas

If it is required to encode dredged areas, this must be done using the feature **Dredged Area**.

Remarks:

- The attribute **depth range minimum value** must be used to encode the dredged depth for the dredged area. Where required, the attribute **depth range maximum depth** must be used to encode the deeper depth where a range of depths for the dredged area is indicated on the source.
- The boundary of a dredged area should not have coincident curve geo features encoded, unless part of the boundary corresponds to the shoreline (see clause 5.3.1).
- Dredged areas are often subject to siltation, resulting in shoaler depths being identified in the dredged area than the designed dredged depth. Where required, the shoal depths should be encoded using **Sounding**, with the appropriate underlying depth information (**Depth Area** and, if required, **Depth Contour**) to support the depths. Alternatively, the attribute **depth range maximum value** for the **Dredged Area** may be set to the designed dredged depth for the dredged area, and the attribute **depth range minimum value** set to the value of the shoalest depth, or a **Caution Area** feature may be encoded covering the shoaler depth area with the depth information provided using the complex attribute **information** (see clause 2.4.6). Where the shoal depths are close to the edge of the dredged area, the dredged area limit may be adjusted to exclude the shoal depths from the surface.
- The attribute **source date** may be used to encode the year of the latest control survey for dredged areas where the dredged depth is not maintained. For dredged areas where the dredged depth is maintained, it is not required to indicate the year of dredging.
- Where the complex attribute **vertical uncertainty** is populated for a **Dredged Area** feature, it must not be equivalent to or degrade the uncertainty indicated by the complex attribute **vertical uncertainty** for the underlying **Quality of Bathymetric Data** Meta feature (see clauses 3.8 and 24.5).
- For additional guidance regarding the encoding of vessel speed limits, see clause 17.4.
- **Dredged Area** features are part of the Skin of the Earth.

Distinction: Depth Area; Dumping Ground.

Inland specific Encoding Instructions:

- A) All navigable water bodies shall be covered by either **Depth Area** (DEPARE, depare) see 11.6, **Dredged Area** (DRGARE) see 11.4 or **Unsurveyed Area** (UNSARE) see 11.8 (Group 1) features.

11.5 Depth contour

IHO Definition: **DEPTH CONTOUR.** A line connecting points of equal water depth which is sometimes significantly displaced outside of soundings, symbols, and other chart detail for clarity as well as generalization. Depth contours, therefore, often represent an approximate location of the line of equal depth as related to the surveyed line delineated on the source. (IHO Dictionary – S-32).

For IENCs a line of constant depth denoting the depth between Shallow Depth and Fairway / Project Depth

S-401 Geo Feature: Depth Contour (DEPCNT) (C)

Primitives: Curve

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
value of depth contour	(VALDCO)	[xx.xx] (metres), e.g., 2.74	RE	1,1
scale minimum	(SCAMIN)	[EUR: 12000, US:18750] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
Vertical Uncertainty	(VERACC)		C	0, 1
Uncertainty Fixed	(POSACC) (SOUACC) (VERACC)	[xx.xx] (metres), e.g., 1.54	(S) RE	1, 1
Uncertainty Variable Factor			(S) RE	0, 1
Category of Temporal Variation	(CATTEV)	4 : Likely to Change 5 : Unlikely to Change 6 : Unassessed	EN	0, 1
Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1

<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0, *
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 †
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0, *
-	Additional Information (see clause 25.1)	Nautical Information	Association	0, *
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0, *
† For each instance of information , at least one of the sub-attributes file reference or text must be populated.				

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

11.5.1 Depth contours

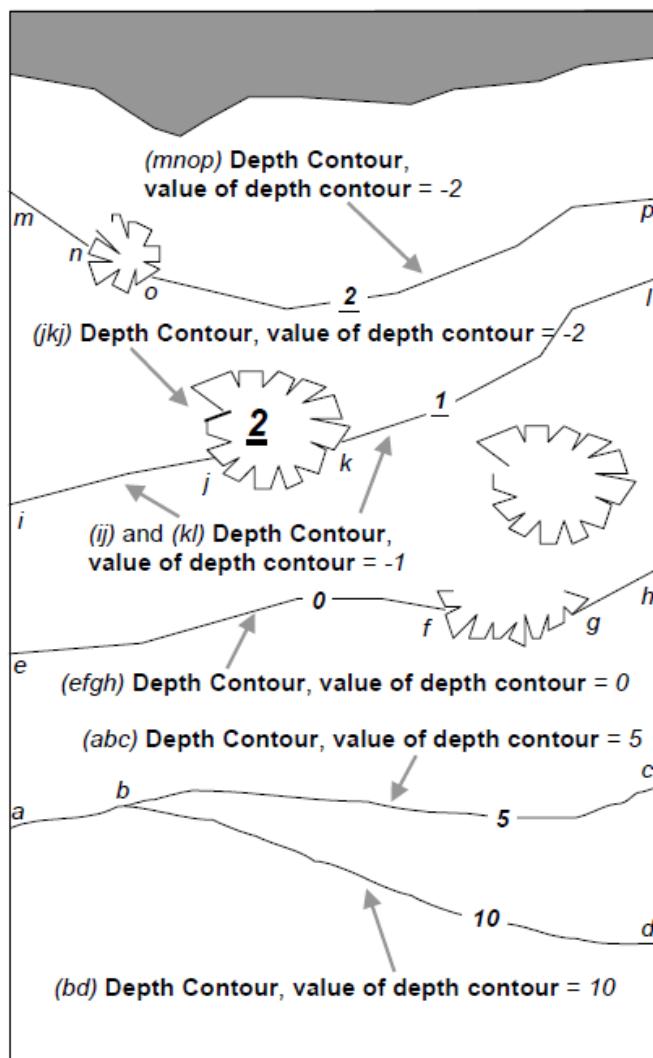


Figure 11-2 – Depth contours

The boundary of a drying rocky area or coral reef may be coincident with the zero metre contour (see 'fg' in the Figure). If it is required to encode this boundary, it must be done using the feature **Depth Contour** with the attribute **value of depth contour = 0**.

On the source, the presentation of contours in areas of steep slope is sometimes generalised so that closely spaced contours are removed to leave a single contour (see 'ab' in Figure). In such cases, this contour must be encoded using the shallowest depth of the slope.

Wherever possible, contours must be closed, or connected to the border of the dataset, a coastline feature or another contour, in order to define closed areas.

Spatial quality associated with contours may be encoded using the **Spatial Quality** information type, attribute **quality of horizontal measurement** (see clause 28.15). This should only be encoded if the spatial quality of the contour(s) is different to that indicated for the overall quality of the bathymetric data in the area as described for the underlying **Quality of Bathymetric Data** meta feature (see clause 3.8). However, in order to provide an additional indication to the boatmaster of areas of lower reliability

bathymetric data, contours in depths of 30 metres or less may have the attribute **quality of horizontal measurement** on the associated **Spatial Quality** information type populated with value 4 (approximate).

Remarks:

- Encoded drying contours must be indicated by negative values for the attribute value of depth contour.

Distinction: Coastline; Depth Area; Sounding.

Inland specific Encoding Instructions:

- A) US: USACE shall show a single **Depth Contour** for project depth (typically 2.74 (9')). A zero (0) **Depth Contour** shall also be used if a Low / High Water Range (Drying Height) exists (refer to 11.6).
- B) EUR: **Depth Contours** shall be encoded between different **Depth Areas** to allow the Inland ECDIS or ECS to highlight the safety depth selected by the boatmaster.

11.6 Depth area

IHO Definition: **DEPTH AREA.** A water area whose depth is within a defined range of values. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.51, November 2000).

For IENCs detailed depth information (surface)

- either referred to one reference water level only: water surface within the waterway whose detailed depth information is within a defined range of values that refer to only one **vertical datum**, the reference water level. or
- referred to a water level model that is applied to **Depth Areas**: a water surface within the waterway in which detailed depth information is known within a defined range of values referenced to a **vertical datum** (the reference water level). The actual water level is provided by a water level model.

S-401 Geo Feature: Depth Area (DEPARE, depare) (C)

Primitives: Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>
		

S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
depth range maximum value	(DRVAL2)	DRVAL2 > DRVAL1 Maximum known depth of depth area: [xx.xx] (metres) or "unknown"	RE	1,1
depth range minimum value	(DRVAL1)	DRVAL1 < DRVAL2 [x.xx] (metres), e.g., 2.74 or "unknown"	RE	1,1
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
Vertical Uncertainty	(VERACC)		C	0,1

Uncertainty Fixed	(POSACC) (SOUACC) (VERACC)		(S) RE	1, 1
Uncertainty Variable Factor			(S) RE	0, 1
Category of Temporal Variation	(CATTEV)	4 : Likely to Change 5 : Unlikely to Change 6 : Unassessed	EN	0, 1
Quality of Vertical Measurement	(QUASOU)	1 : Depth Known 2 : Depth or Least Depth Unknown 8 : Value Reported (Not Surveyed) 10 : Maintained Depth 11 : Not Regularly Maintained	EN	0, 1
Elevation 1 of Surface (m)	(eleva1)	Maximum elevation 1 of a depth area: [xx.x] (metres) or "unknown"	RE	0, 1
Elevation 2 of Surface (m)	(eleva2)	Minimum elevation 2 of a depth area: [xx.x] (metres) or "unknown"	RE	0, 1
Waterway Distance	(wtwdis)	[xxxx.xxx] (units defined in distance unit of measurement), e.g., 2451.732	RE	0, 1
Distance Unit of Measurement	(hunits)	1 : Metres 2 : Yards 3 : Kilometres 4 : Statute Miles 5 : Nautical Miles 7 : Hectometres	EN	0, 1
Reported Date	(SORDAT)		TD	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
<i>.....Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed	(S) EN	0, 1

		8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data		
.....Source	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Component	Exceptional Navigation Structure Aggregation (see clause 0)	Exceptional Navigation Structure	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

† For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

11.6.1 Depth areas

The sea area, the intertidal area and the navigable parts of rivers, lakes and canals must be divided into depth areas, each of them having a range of depth.

As many depth areas as possible must be created using encoded depth contours.

Remarks:

- **Depth Area** features are part of the Skin of the Earth.

11.6.2 Geometry of depth areas

Where surfaces are not closed on the source, it may be necessary to close these surfaces using edges without associated curve features. This is mandatory at the boundary of a dataset (see Figure 11-3 below).

In Figure 11-3 below, the annotation “min” equates to the attribute **depth range minimum value** and the annotation “max” equates to the attribute **depth range maximum value**.

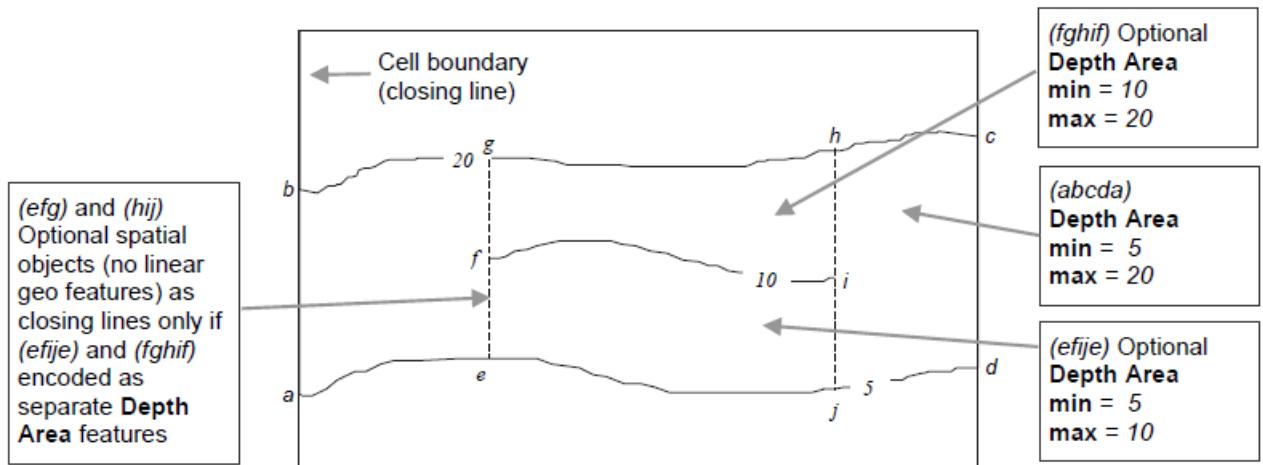


Figure 11-3 – Geometry of depth areas

Remarks:

For short isolated sections of **Depth Contour** features such as (fi), it is up to the producing authority whether to encode the small areas (efije and fgdif) as separate **Depth Area** features, or to encode only the curve (fi) as a floating **Depth Contour** feature within a single **Depth Area** (abcd) having attributes **depth range minimum value** = 5 and **depth range maximum value** = 20.

NOTE: In Figure 11-3, if the optional **Depth Area** features are encoded, the depth area (abcd) will be split into two separate **Depth Area** features (abgea) and (jhcdj), both having **depth range minimum value** = 5 and **depth range maximum value** = 20.

11.6.3 Use of attributes **depth range minimum value** and **depth range maximum value** for depth areas in general

For each depth area, **depth range minimum value** and **depth range maximum value** should be encoded with the values corresponding to the shallowest and deepest depths in that area. These values, except for the shallowest and deepest areas, should be chosen from the values of the depth contours encoded in the dataset, however the values for isolated shallow or deep areas may be taken from the shallowest or deepest measured depth (see items 2 and 3 in Figure 11-4 below).

A drying area, within which a drying height is indicated without a true position, should be encoded using a **Depth Area** feature, with **depth range minimum value** set to the value of the drying height and **depth range maximum value** set to a dataset contour value (usually zero). Alternatively, **depth range minimum value** for the **Depth Area** may be set to -H (see NOTE (a) associated with Figure 11-4 below for definition of H), with the drying height encoded using the complex attribute **information** (see clause 2.4.6), sub-attribute **text** (for example Dries 1.4).

If a depth area is adjacent to a non-navigable waterway, a closing curve (that is, no curve geo feature) should be encoded at the boundary between navigable and non-navigable waters. See clause 11.6.4. In Figure 11-4 below, the annotation “min” equates to the attribute **depth range minimum value** and the annotation “max” equates to the attribute **depth range maximum value**.

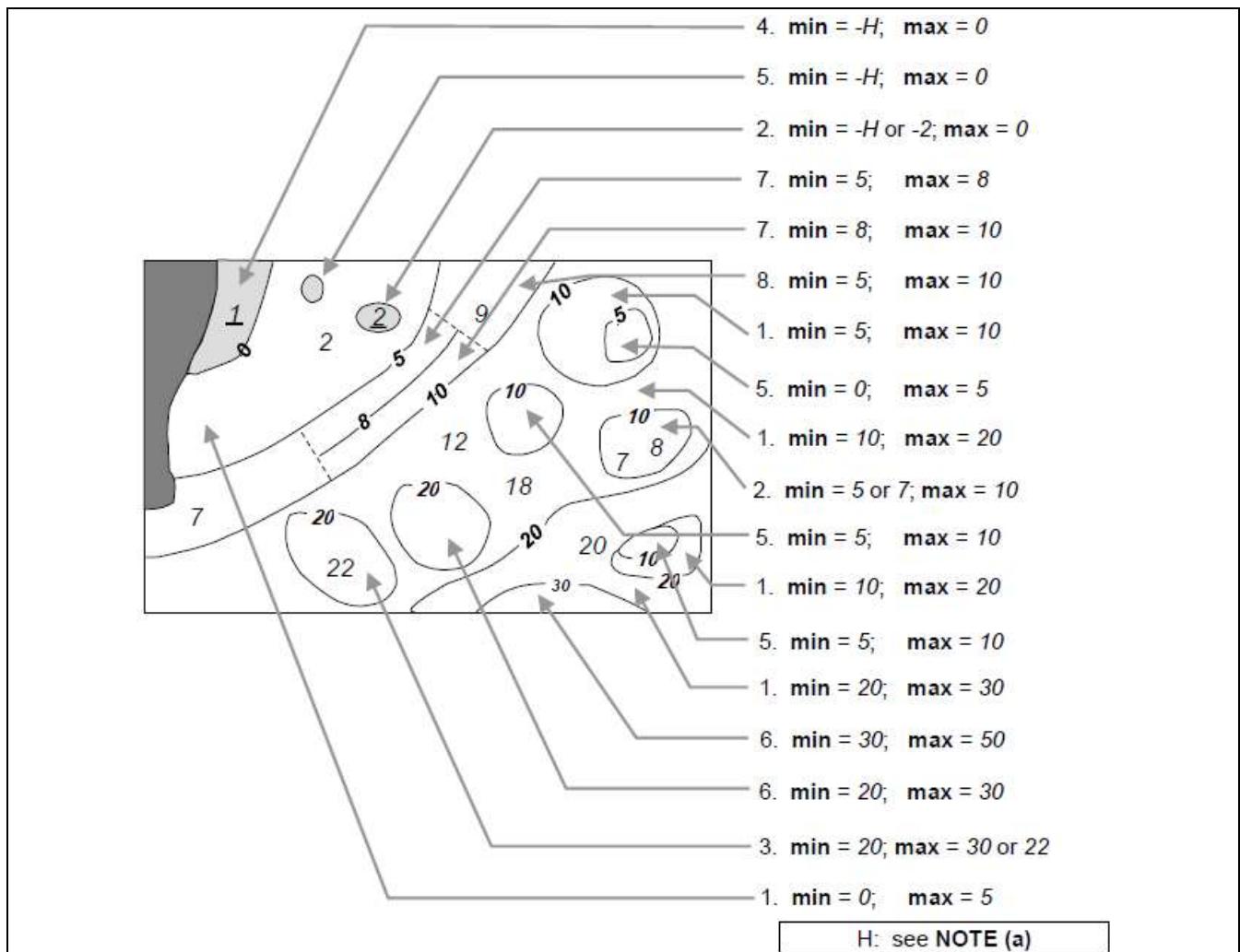


Figure 11-4 – Depth areas

NOTE (a): H = Height of the coastline datum above sounding datum, or a rounded value (for example (1) the value of the highest drying contour indicated on the source document; or (2) zero, if the shoreline datum is the same as the sounding datum).

In the following clauses, the paragraph numbers refer to the item numbers in Figure 11-4. These clauses do not cover all encoding scenarios.

1. If the depth area is bounded by two or more depth contours:
 - **depth range minimum value** should take the value of the dataset depth contour immediately shallower than the value of **depth range maximum value**.
 - **depth range maximum value** should take the value of the deepest depth contour bounding the area.
2. If the depth area is only bounded by one depth contour and the deepest depth is shown by a depth contour, and the shallowest depth is shown by a sounding (an isolated shoal area):
 - **depth range minimum value** should take the value of the dataset depth contour immediately shallower than the value of the sounding or -H. However if the shallowest sounding within the area is considered to be the least depth of the shoal, **depth range minimum value** may be populated with the value of this sounding.

- **depth range maximum value** should take the value of the depth contour.

NOTE: In the case where the shallowest depth in the area is equal to the bounding depth contour, both depth range minimum value and depth range maximum value may be populated with the value of the depth contour.

3. If the depth area is only bounded by one depth contour and the deepest depth is shown by a sounding and the shallowest depth is shown by a depth contour (an isolated deep area):

- **depth range minimum value** should take the value of the depth contour.
- **depth range maximum value** should take the value of the dataset depth contour immediately deeper than or equal to the value of the sounding. However if the deepest sounding within the area is considered to be the deepest depth of the deep, **depth range maximum value** may be populated with the value of this sounding.

4. If the shallowest depth is defined by the shoreline:

- **depth range minimum value** should take the value of -H.
- **depth range maximum value** should take the value of the shallowest dataset depth contour bounding the area.

5. If the depth area is bounded by only one depth contour, contains no soundings, and is a shoal:

- **depth range minimum value** should take the value of the dataset depth contour immediately shallower than the value of the depth contour, or -H.
- **depth range maximum value** should take the value of the depth contour.

6. If the depth area is bounded by only one depth contour, contains no soundings, and is a deep:

- **depth range minimum value** should take the value of the depth contour.
- **depth range maximum value** should take the value of the standard depth contour immediately deeper than the value of the depth contour.

7. If the depth area is bounded by an incomplete depth contour on one side (such as in incompletely surveyed area), and a complete depth contour on the other:

- These areas are optional. See clause 11.6.2 above and associated Figure 11-3.

8. If the depth area is bounded by complete depth contours, but contains an incomplete (floating) depth contour:

- **depth range minimum value** should take the value of the shallowest depth contour.
- **depth range maximum value** should take the value of the deepest depth contour.

NOTE: Where the optional depth areas in paragraph 7 above are encoded, this will result in two discrete **Depth Area** features, one on each side of the encoded optional depth areas. See clause 11.6.2 above and associated Figure 11-3.

11.6.4 Rivers, canals, lakes, basins, locks

Where these areas are navigable at the optimum display scale for the IENC data, they must be encoded using the Skin of the Earth features **Depth Area**, **Dredged Area** or **Unsurveyed Area**, and coastline-type features **Coastline** or **Shoreline Construction**. If it is required to encode the nature and name of the area, it must be done using the feature **Sea Area/Named Water Area**.

Where these areas are required and are not navigable at the optimum display scale for the IENC data, they must be encoded using the features **River**, **Canal** or **Lake**. These features must be covered by **Land Area** features.

11.6.5 Areas of continual change

If it is required to encode an area of continually changing bathymetry, it must be done by populating the attribute **category of temporal variation** = 2 (likely to change and significant shoaling expected) or 3 (likely to change but significant shoaling not expected) for the underlying **Quality of Bathymetric Data** feature (see clause 3.8).

Such areas must always overlap **Depth Area** features.

An area on the source with the indication "Less water" should be encoded using the feature **Caution Area** (see clause 16.11). Caution notes in such areas must be encoded using the complex attribute **information** (see clause 2.4.6).

If it is required to encode sandwaves, this must be done using the feature **Sandwave** (see clause 12.4).

Distinction: Depth Contour; Dredged Area; Obstruction; Sea Area/Named Water Area; Sounding; Unsurveyed Area; Wreck.

Inland specific Encoding Instructions:

- A) All navigable water bodies shall be covered by either **Depth Area** (DEPARE, depare) see 11.6, **Dredged Area** (DRGARE) see 11.4 or **Unsurveyed Area** (UNSARE) see 11.8 (Group 1) features.
- B) The reference water level is only provided in the cell header (field: DSPM, subfield SDAT) or in the meta feature **Sonding Datum** (m_sdat) plus attribute **vertical datum** (verdat), if applicable (e.g., within a cell where two rivers with different reference water levels meet). **Vertical datum** (VERDAT) on individual features related to depth is prohibited.
- C) Shallow depth areas with a diameter less than 10 m have to be encoded additionally as **Underwater Rock, Wreck** or **Obstruction** (see 13.4 Rocks, 13.5 Wrecks or 13.6 Obstructions).
- D) Detailed Depth - referenced to one water level
 - i) If the shallowest depth of an unsurveyed area near the shore is defined by the river bank and the position of the riverbank is not exactly known, **depth range minimum value** (DRVAL1) = height of the riverbank above sounding/vertical datum, normally it is "unknown". **Depth range maximum value** (DRVAL2) takes the value of the deepest **Depth Contour** bounding the area. **Quality of vertical measurement** (QUASOU) has to be encoded (see 3.11 and 11.8).
 - ii) If the shallowest depth of an unsurveyed area near the shore is defined by the river bank and the position of the river bank is exactly known, **depth range minimum value** (DRVAL1) = "0". **Depth range maximum value** (DRVAL2) takes the value of the deepest **Depth Contour** bounding the area. Drying areas have to be encoded according to D (low/high water range) **quality of vertical measurement** (QUASOU) has to be encoded (see 3.11 and 11.8).
- E) Detailed Depth - water level model
 - i) The following encoding instructions must only be followed if a water level model shall be applied to the **Depth Areas**.
 - ii) Cut the **Depth Areas** at defined waterway profiles in order to be able to assign a **waterway distance** to the **Depth Area**.
 - iii) If the shallowest depth of an unsurveyed area near the shore is defined by the river bank and the position of the riverbank is not exactly known, DRVAL1 = height of the riverbank

	above sounding/vertical datum, normally it is “unknown”. DRVAL2 takes the value of the deepest depth contour bounding the area. QUASOU has to be encoded (see C.1.7 and I.1.9).
iv)	If the shallowest depth of an unsurveyed area near the shore is defined by the river bank and the position of the river bank is exactly known, DRVAL1 = “0”. DRVAL2 takes the value of the deepest depth contour bounding the area. Drying areas have to be encoded according to I.1.6 (low/high water range). QUASOU has to be encoded (see C.1.7 and I.1.9).
v)	Add the attribute elevation 1 of surface (m) (eleva1) which is corresponding to depth range minimum value (DRVAL1), if it is needed for the water level model. Elevation 1 of surface (m) (eleva1) is used to define the maximum elevation of the bottom of a river referred to a reference gravitational level (reflev).
vi)	Add the attribute elevation 2 of surface (m) (eleva2) which is corresponding to depth range maximum value (DRVAL2), if it is needed for the water level model. Elevation 2 of surface (m) (eleva2) is used to define the minimum elevation of the bottom of a river referred to a reference gravitational level (reflev).
vii)	Add the attribute waterway distance (WTWDIS) with the value of the waterway distance of the downstream situated waterway profile. Do this in order to calculate the values for elevation 1 of surface (m) (eleva1) and elevation 2 of surface (m) (eleva2) automatically out of depth range minimum value (DRVAL1) and depth range maximum value (DRVAL2) (which are referred to the reference water level whose height above the reference gravitational level (reflev) is stored in the attribute height (HEIGHT) of the downstream situated feature Waterway Profile (wtwprf). (See Waterway Profile 15.25)
viii)	If the actual water level, that is provided by a water level model, is also referred to the same gravitational reference level, one can link the Depth Areas with the actual water level using elevation 1 of surface (m) (eleva1) and elevation 2 of surface (m) (eleva2).
F)	Fairway Depth / Project Depth
i)	This coding method for depth is only a minimum requirement for displaying the official water depth of the fairway that is available for the continuous navigation. If more detailed depth information is available use “Detailed Depth – ref. to one reference water level “ or “Det. Depth - water level model”.
ii)	The Depth Area shares the geometry of the Fairway with the depth range minimum value (DRVAL1) = official water depth in metres issued by the competent authority. The depth range maximum value (DRVAL2) has to be set to “unknown”.
iii)	US: depth range minimum value (DRVAL1) = 2.7 (equivalent to typical project depths for vast majority of shallow draft projects) and depth range maximum value (DRVAL2) = “unknown” if value is not known.
iv)	US: A Shallow Depth area or unsurveyed area must form the boundary between the Project Depth and the land, unless Depth Area (DEPARE, depare) is within the lock chamber.
v)	EUR: On each side of the Fairway there must be a Depth Area between the shoreline and the boundary of the fairway with depth range minimum value (DRVAL1) = “unknown” and depth range maximum value (DRVAL2) = official water depth in metres issued by the competent authority.
vi)	EUR: quality of vertical measurement (QUASOU) = 10 (maintained depth) or 11 (depth not regularly maintained) should be used to indicate the reliability of the depth information due to the legal status of the fairway.
G)	Low / High Water Range (Drying Height)
i)	Surface should border the shoreline and top bank.
ii)	In case of tidal influence, use -H, where -H is height of tide
iii)	US: information (INFORM) is mandatory: “Range between low and high water conditions”
H)	Shallow Depth

- i) US: Encode the **Depth Area** between the **Shoreline** (COALNE) and the project depth area ; **depth range minimum value** (DRVVAL1 = 0) and **depth range maximum value** (DRVVAL2) = 2.7
- I) The feature **Lock Basin** (lokbsn) and **Lock Basin Part** (lkbspt) must be covered by a **Depth Area** (DEPARE, depare).

11.7 Areas with inadequate depth information

11.7.1 Inadequately surveyed areas

Inadequately surveyed areas may be defined as those areas where bathymetry is based on older lead line surveys or other surveys which are either open in nature (for example reconnaissance surveys), or are not hydrographic surveys (for example seismic surveys). These types of surveys are inadequate for identifying all shoals that may exist between lines of soundings, or may not be "shoalbiased" in their selection of recorded depths.

An inadequately surveyed area should be encoded using either an **Unsurveyed Area** feature, within which soundings and contours may be encoded (but not depth areas), or using **Depth Area** features. The attributes **depth range minimum value** and **depth range maximum value** for such depth areas should have explicit values.

The area must also be covered by **Quality of Bathymetric Data** features (see clause 3.8), having appropriate attribute values, usually **category of temporal variation** = 6 (unassessed), **features detected (significant features detected)** = *False*, and **full seafloor coverage achieved** = *False*. Further information may be given using the Meta feature **Quality of Survey** (see clause 3.11), where appropriate.

A cautionary note should also be encoded using a **Caution Area** feature of type surface (see clause 16.11), complex attribute **information** (see clause 2.4.6).

11.7.2 Bathymetry in areas of minimal depiction of detail on paper charts

Where areas of little or no depth information exist within a specified IENC usage, they should be encoded using one of the following options:

11.7.2.1 Areas of omitted bathymetry

Encoders are advised that when encoding areas of bathymetry from paper charts containing minimal depth detail at scales that correspond to the optimum display scale for the data, to consult larger scale paper charts or optimum display scale IENC datasets and generalise the bathymetry from this data. This is done to ensure that sufficient information is encoded so as not to conflict with larger optimum display scale coverage. The following is the recommended minimum encoding requirement in such cases:

Where larger optimum display scale IENC coverage is available, the larger scale datasets should be examined to determine the shallowest **Depth Area** feature, other than the intertidal area, within the whole of the area. Intertidal areas should then be generalised from the larger optimum display scale coverage, and one **Depth Area** feature may then be created, with attributes **depth range minimum value** and **depth range maximum value** encoded from the values obtained from the larger scale, corresponding to the remaining area of bathymetry.

Where larger optimum display scale coverage does not exist, a single **Depth Area** feature may be created to cover the area of omitted bathymetry. The **depth range minimum value** of the **Depth Area** feature should be set to the shallowest value appropriate to the colour tint that is applied to it (for example if blue tint is used for 5-20m areas, the **depth range minimum value** for the area of omitted bathymetry should be set to 5). The **depth range maximum value** should be set to the shallowest value of the surrounding Skin of the Earth polygons.

In either case, the areas should be covered by a **Caution Area** feature, the boundary of which follows exactly the surrounding Skin of the Earth features (see clause 2.5.3.2).

Encoders should consider the effect of over-generalising areas of omitted bathymetry on the Inland ECDIS or ECS display as the boatmaster “zooms out” through the IENC display scales.

11.7.2.2 Areas of very simplified bathymetry

In these areas, information relating to bathymetry (for example depth contours, dangers, rocky areas, isolated rocks, nature of the seabed, dredged areas, unsurveyed areas) should be individually encoded as normal.

A **Caution Area** feature (see clause 16.11) should be created covering the **Depth Area** features within the area of simplified bathymetry, with a cautionary note encoded using the complex attribute **information** (see clause 2.4.6).

11.7.3 Depth discontinuities between surveys

Depth discontinuities between adjoining or overlapping source bathymetric surveys may be caused by:

- Surveys in areas of continually changing depth (see clause 11.6.5) conducted with a significant time gap between the surveys; or
- Adjoining areas having significant differences in the quality of bathymetric data (see clause 3.8).

It may not be possible to safely resolve significant depth discontinuity by interpolating approximate depth contours, which may compromise the ability for the compiler to adequately encode complete, non-overlapping Skin of the Earth coverage of the area of the IENC cell covered by data. Where it is required to indicate these significant depth discontinuities, it should be done by encoding a “very narrow” **Unsurveyed Area** feature.

The “very narrow area” should be at least 0.3 mm in width at optimum display scale for the IENC data.

Remarks:

- An indication of the purpose of the **Unsurveyed Area** may be done by population of the complex attribute **information** (see clause 2.4.6), sub-attribute **text**, for example *Discontinuity between surveys*.
- In order to provide an indication to the boatmaster of the more reliable encoded bathymetry in an area of continually changing depth, the defining attributes should be downgraded for the **Quality of Bathymetric Data** feature (see clause 3.8) corresponding to the less reliable (or older) data.

11.7.4 Satellite imagery as source information

In some areas source information may be limited to shallow water depth information derived from satellite imagery. Where defined depths can be interpolated from satellite imagery (for example the drying line, 5 metre or 10 metre depth contours), and little or no reliable source survey information exists in the area, consideration should be given to showing this information in IENCs.

If it is required to encode shoal areas which have been derived from satellite imagery, **Depth Area** and **Depth Contour** features of an appropriate depth range should be used. This should only be done in areas which have not been systematically surveyed. Areas of depth information derived from satellite imagery must be covered by **Quality of Bathymetric Data** Meta features (see clause 3.8). Recommended attribute values for the **Quality of Bathymetric Data** include **category of temporal variation** = 6 (unassessed);

features detected (significant features detected) = *False*; and full seafloor coverage achieved = *False*. Optionally, the area may also be covered by a **Quality of Survey** feature (see clause 3.11), having attribute **technique of vertical measurement** = 11 (satellite imagery).

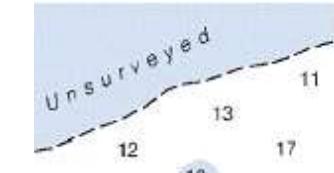
In some cases satellite imagery provides evidence that existing charted information derived from source survey data has changed over time. If required, the attribute **category of temporal variation** on the underlying **Quality of Bathymetric Data** Meta feature should be amended to 2 (likely to change and significant shoaling expected) or 3 (likely to change but significant shoaling not expected). Alternatively, if the quality of the charted bathymetry is considered by the producer to be poor, consideration may be given to replacing the existing charted detail using the satellite derived data, as described above, however with **category of temporal variation** = 2 (likely to change and significant shoaling expected) or 3 (likely to change but significant shoaling not expected).

11.8 Unsurveyed area

IHO Definition: **UNSURVEYED AREA.** An area where hydrographic survey data is non-existent. (IHO Dictionary – S-32).

S-401 Geo Feature: Unsurveyed Area (UNSARE) (C)

Primitives: Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>
		

S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (N/INFOM)		(S) TE	0,1 †
Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Quality of Vertical Measurement	(QUASOU)	2 : Depth or Least Depth Unknown 8 : Value Reported (Not Surveyed)	EN	0, *
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health	(S) EN	0, 1

		7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

11.8.1 Unsurveyed areas

Unsurveyed areas may be defined as those within which there is no available data derived from a systematic hydrographic survey. This may include areas which only have lines of passage soundings and/or other miscellaneous data such as isolated ship's reports.

Areas with little or no bathymetric survey information must be encoded using the feature **Unsurveyed Area**.

The area must also be covered, where required, by **Quality of Bathymetric Data** features (see clause 3.8), with attributes **category of temporal variation** = 6 (unassessed), **data assessment** = 1 (assessed), **features detected (least depth of detected features measured and significant features detected)** = *False* and **full seafloor coverage achieved** = *False*; and (if encoded on **Quality of Bathymetric Data**) **horizontal position uncertainty (uncertainty fixed)** = [empty (null)] and **vertical uncertainty (uncertainty fixed)** = [empty (null)]. If encoded on an instance of the information type **Spatial Quality** (see clause 24.5) associated to the **Quality of Bathymetric Data**, the horizontal position and vertical accuracies must be encoded as attributes **horizontal position uncertainty (uncertainty fixed)** = [empty (null)] and **vertical uncertainty (uncertainty fixed)** = [empty (null)].

Remarks:

- **Unsurveyed Area** features are part of the Skin of the Earth.
- **Unsurveyed Area** features containing no depth data or bathymetry are not required to be covered by **Quality of Bathymetric Data** features (see clause 3.8).

Distinction:

Inland specific encoding instructions:

- A) Those areas in the river which cannot be surveyed, for example, due to depths too shallow for surveying boats and hence no depth data is available, shall be coded by **Unsurveyed Area** (UNSARE). This shall only be done for areas below the specific water level to which the depth of the river is referred. For areas above this specific water level, **Depth Area** (DEPARE, depare) with **depth range maximum value** (DRVAL2) = 0 shall be used (refer to 11.6).
- B) Especially in case parts of the navigable water area are not surveyed but may be deep enough for navigation, **Depth Area** (DEPARE, depare) with **quality of vertical measurement** (QUASOU) = 2 (depth unknown) or 8 (value reported (not surveyed)) shall be used in order to show that ships may navigate in these areas as well. This may imply especially for sidearms or private marinas.
- C) All navigable water bodies shall be covered by either **Depth Area** (DEPARE, depare) 11.6, **Dredged Area** (DRGARE) 11.4 or **Unsurveyed Area** (UNSARE) 11.8 (Group 1) features.

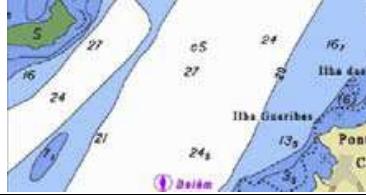
12 Geo Features – Nature of the Seabed

12.1 Seabed area

IHO Definition: **SEABED AREA.** A region of the seabed including the material of which it is composed and its physical characteristics. Also called nature of bottom, character (or characteristics) of the bottom, or quality of the bottom. (Adapted from IHO Dictionary – S-32).

S-401 Geo Feature: Seabed Area (SBDARE) (O)

Primitives: Point, Curve, Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
				
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
<i>feature name</i>		See clause 2.5.8	C	0,*
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 †
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>surface characteristics</i>			C	1,* (ordered)
<i>nature of surface</i>	(NATSUR)	1 : mud 2 : clay 3 : silt 4 : sand 5 : stone 6 : gravel 7 : pebbles 8 : cobbles 9 : rock 11 : lava 14 : coral 17 : shells 18 : boulder	(S) EN	0,1 †
<i>nature of surface – qualifying terms</i>	(NATQUA)	1 : fine 2 : medium 3 : coarse 4 : broken 5 : sticky 6 : soft 7 : stiff 8 : volcanic 9 : calcareous 10 : hard	(S) EN	0,3 †

underlying layer			(S) IN	0,1
<i>water level effect</i>	(WATLEV)	3 : always under water/ submerged 4 : covers and uncovers 5 : awash	EN	0,1
scale minimum	(SCAMIN)	[45000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFOM)		(S) TE	0,1 †
Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1

.....Source	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0, *
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0, *
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0, *
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0, *

† Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **surface characteristics**, at least one of the sub-attributes **nature of surface** or **nature of surface – qualifying terms** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

12.1.1 Description of the seabed

The nature (quality) of the seabed (bottom) must be shown in sufficient detail, where known and on the appropriate optimum display scale IENC data, for such purposes as:

- to give some guidance on holding characteristics when anchoring;
- to help in assessing the stability of shoals and to distinguish rocks from unconsolidated material, when navigating in shoal areas;
- to show where vessels may safely take the ground at low water in tidal areas; or
- to give an indication of the nature of the seabed in deeper waters for fishermen and submariners.

If it is required to encode an area of the sea where the nature of the seabed is homogeneous, it must be done using the feature **Seabed Area**.

Remarks:

- Generally, it is not possible to define a seabed area by its real extent, due to seabed samples usually being obtained at discrete locations. For that reason, the characteristics of the seabed area may be represented at one single position.
- Where the seabed comprises a mixture of material, **surface characteristics** must be populated as multiple iterations, with the main constituent given first.
- Where the seabed comprises layered material that is of relevance to navigation or anchoring, **surface characteristics** must be populated as multiple iterations, with the surface constituent given first, with a value for the attribute **underlying layer** of 0. Successive layers below the surface must have **underlying layer** set to 1, 2,

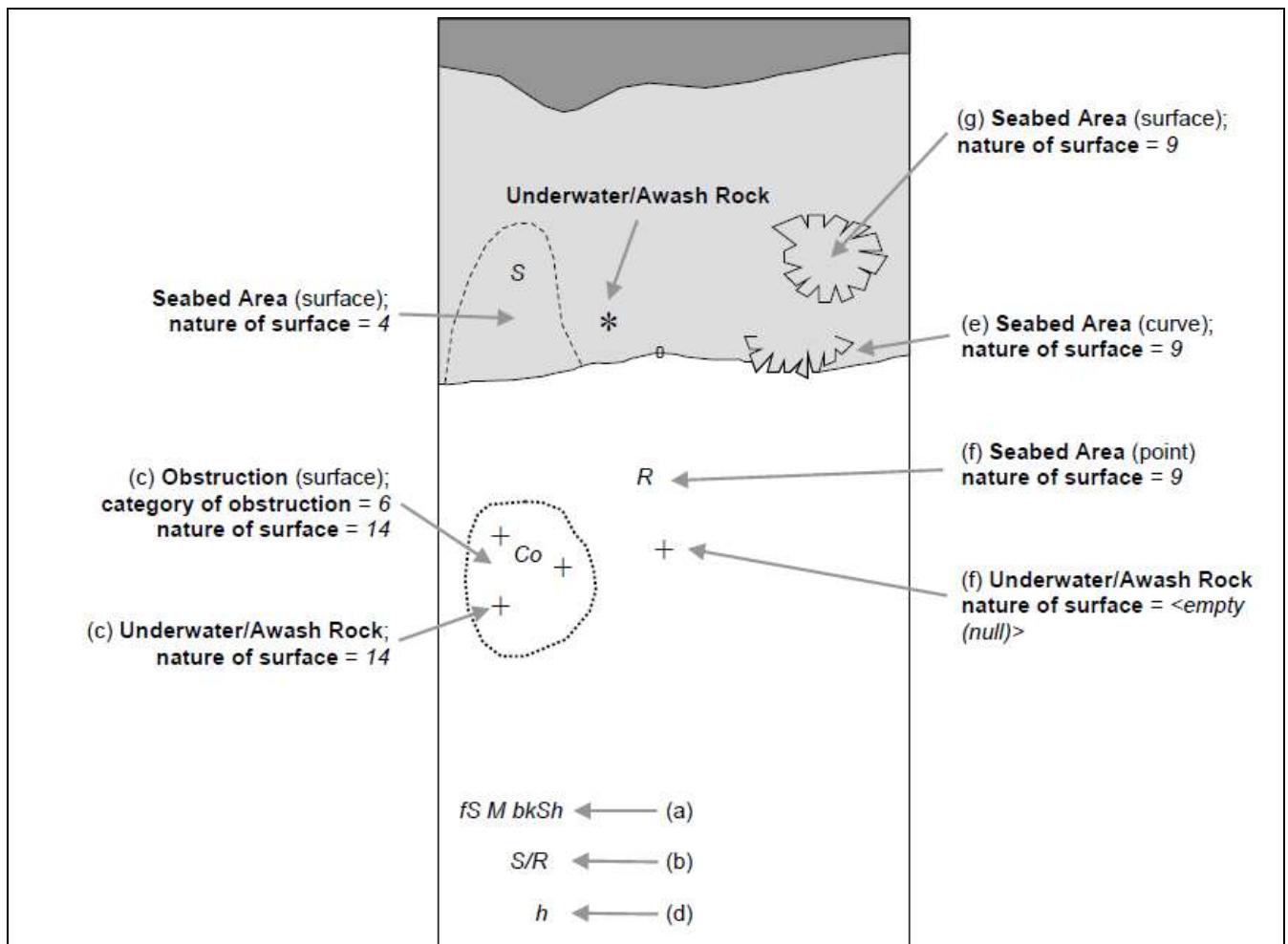


Figure 12-1 – Seabed areas

In the following clauses, the paragraph prefixes refer to the examples shown in Figure 12-1.

- Mixed natures: The dominant nature of the seabed (**nature of surface**) should be populated first, along with its associated qualifying term (**nature of surface – qualifying terms**), if required, using the complex attribute **surface characteristics**. Other natures should then be populated, in order of dominance, using further ordered instances of **surface characteristics**,
- Underlying material: Should be encoded in the same way as mixed natures, and populating the subattribute **underlying layer** with the appropriate level of the layer below the surface layer. The surface layer must be encoded first, followed by the underlying layers.
- Coral reef, which is always covered, represented as a surface: An **Obstruction** feature of type surface must be encoded with attributes **category of obstruction** = 6 (foul area), **nature of surface** = 14 (coral) and **water level effect** = 3 (always underwater/submerged). This feature must be covered by a **Depth Area** or **Unsurveyed Area** feature as appropriate. In this area, some point dangers may be shown. An **Underwater/Awash Rock** feature should be encoded for each individual point danger, with **nature of surface** = 14 (coral).
- Hard bottom: The attribute **nature of surface – qualifying terms** = 10 (hard) should be encoded, with the associated **nature of surface** populated with an empty (null) value.
- On the source, in the intertidal area or along the drying line, the nature of surface is sometimes shown by an open line rather than a closed area. In such cases, a **Seabed Area** feature of type curve should be encoded, with attribute **water level effect** = 4 (covers and uncovers).

- (f) If it is required to encode a rock pinnacle which is dangerous to navigation, it must be done using the feature **Underwater/Awash Rock**, while a rocky nature of seabed should be encoded using a **Seabed Area** feature.
- (g) Where a **Seabed Area** feature of type surface is located in an intertidal area, it should be encoded with **water level effect = 4** (covers and uncovers), in order for the intertidal rock or coral symbol to be displayed in Inland ECDIS or ECS.
- The nature of the seabed should be shown in depths of 2000 m and less. The nature of the seabed may be shown in greater depths if thought to be useful.

Table 12-1 below contains the most common encoding combinations of **nature of surface** and **nature of surface – qualifying terms**; other coding combinations are possible.

- Qualifying Terms Nature of Surface	1 fine	2 medium	3 coarse	4 broken	5 sticky	6 soft	7 stiff	8 volcanic	9 calcareous	10 hard
1 Mud					x	x	x	x	x	
2 Clay					x	x	x			
3 Silt					x	x	x			
4 Sand	x	x	x			x		x	x	
5 Stone								x	x	
6 Gravel								x	x	
7 Pebbles								x	x	
8 Cobbles								x	x	
9 Rock								x	x	
11 Lava								x		
14 Coral				x		x				
17 Shells				x					x	
18 Boulder								x	x	

Table 12-1 – Seabed area – Common encoding combinations

Distinction: Sandwave; Sea Area/Named Water Area; Seagrass; Weed/Kelp.

Inland specific Encoding Instructions:

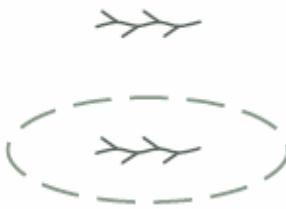
- A) Coding as point, curve or surface is subject to data availability or subject to the scale of the chart.

12.2 Weed/kelp

IHO Definition: **WEED/KELP.** Any macroscopic marine alga. (Adapted from IHO Dictionary – S-32).

S-401 Geo Feature: Weed/Kelp (WEDKLP) (O)

Primitives: Point, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
				
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of weed/kelp	(CATWED)	1 : kelp 2 : seaweed 4 : sargasso	EN	1,1
<i>feature name</i>		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
scale minimum	(SCAMIN)	[22000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 [†]
Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1

<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

12.2.1 Weed - Kelp

If it is required to encode marine weed or kelp, it must be done using the feature **Weed/Kelp**.

Remarks:

- For the boatmaster, the presence of kelp is also generally an indication of the presence of submerged rocks.

Distinction: Seabed Area; Seagrass; Vegetation.

Inland specific Encoding Instructions:

12.3 Seagrass

IHO Definition: **SEAGRASS.** Any of various submerged monocotyledonous plants (such as eelgrass, tape grass, and turtle grass) of tropical to temperate usually shallow coastal waters that have narrow grass-like leaves and often form dense underwater meadows. (Merriam-Webster on-line dictionary).

S-401 Geo Feature: Seagrass (WEDKLP) (O)

Primitives: Point, Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
<i>feature name</i>		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
scale minimum	(SCAMIN)	[22000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance	(S) EN	0, 1

		15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

12.3.1 Seagrass

If it is required to encode seagrass, it must be done using the feature **Seagrass**.

Remarks:

- Many seagrass beds are subject to strict protection measures. Such measures must be encoded, where required, using the features **Restricted Area** (see clause 17.8).
- If considered necessary, the type of seagrass may be encoded using the complex attribute **information** (see clause 2.4.6).

Distinction: Seabed Area; Vegetation; Weed/Kelp.

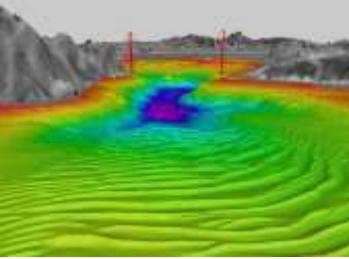
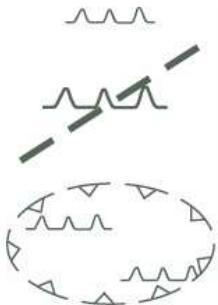
Inland specific Encoding Instructions:

12.4 Sandwave

IHO Definition: **SANDWAVE.** Large mobile wave-like sediment feature in shallow water and composed of sand. The wavelength may reach 100 metres; the amplitude may be up to 20 metres. (IHO Dictionary – S-32).

S-401 Geo Feature: Sandwave (SNDWAV) (O)

Primitives: Point, Curve, Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>
		 <p>Sand waves as a point Sand waves as a line Sand waves as an area</p>

S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
vertical length	(VERLEN)	[xxx.x] (metres), e.g., 0.5	RE	0,1
scale minimum	(SCAMIN)	[22000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Reported Date	(SORDAT)		TD	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery	(S) EN	0, 1

		14 : Finance 15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0, *
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0, *
-	Additional Information (see clause 25.1)	Nautical Information	Association	0, *
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0, *

† For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

12.4.1 Sandwaves

Sandwave areas may be dangerous to boatmasters, as the depth may be less than charted, because surveys are not necessarily conducted at the ideal time for sandwave building. Some research has shown that sandwave mobility is most evident in the vertical plane and high spots may occur on crest lines in response to calm weather, and possibly during particular times within the tidal cycle. It is therefore important to warn the boatmaster of the presence of sandwaves, and provide them with as much information as is available and can be included in the IENC.

If it is required to encode sandwaves, this must be done using the feature **Sandwave**.

Remarks:

- The shifting nature of the seabed resulting from sandwave activity should be indicated on the underlying **Quality of Bathymetric Data** (see clause 3.8), using the attribute **category of temporal variation**.

- The attribute **vertical length** is used to populate the amplitude of the sandwave above the seafloor, where known.
- Care must be taken not to over-generalize depth depiction in sandwave areas, as the typically convoluted contour pattern, and significant depth changes between soundings selected from crests and troughs, help to draw attention to these features. However, this will not usually be sufficient warning, as the variance between crest and trough may fall between standard contours, or the optimum display scale for the IENC data may be insufficient to show the sandwaves individually, or anything but the shoalest soundings. Attention should therefore be drawn to the area by encoding a **Sandwave** feature. If considered necessary, the nature of any navigational hazard presented by the sandwaves may be incorporated using the complex attribute **information** (see clause 2.4.6).
- Where frequently repeated surveys show variations in least depth, the shoalest soundings obtained over a period of years should be encoded. This blending of details from surveys of differing dates must be done with care; in particular, long-term deepening must not be overlooked.

Distinction: Seabed Area.

Inland specific Encoding Instructions:

13 Geo Features – Rocks, Wrecks, Foul Ground, Obstructions

Full details of all dangers to navigation must be encoded except in those areas for which the IENC is clearly inappropriate for navigation. The fullest possible information on clearance depths must be given irrespective of their depths, in preference to making any arbitrary distinction between “dangerous” and “non-dangerous” depths. This will allow boatmasters of all classes of vessels, including deep-draught ships and submarines, to make their own assessments of what is dangerous to them.

Due to possible Inland ECDIS or ECS display issues isolated dangers of type point (feature types **Underwater Rock**, **Wreck** and **Obstruction**) should be encoded as isolated nodes; that is, they should not be encoded on connected nodes. Similarly, isolated dangers should not be encoded on an edge of a **Depth Area**, **Dredged Area** or **Unsurveyed Area**; where this occurs the geometry of the Skin of the Earth features should be amended.

13.1 Danger line limiting an area of wrecks or obstructions

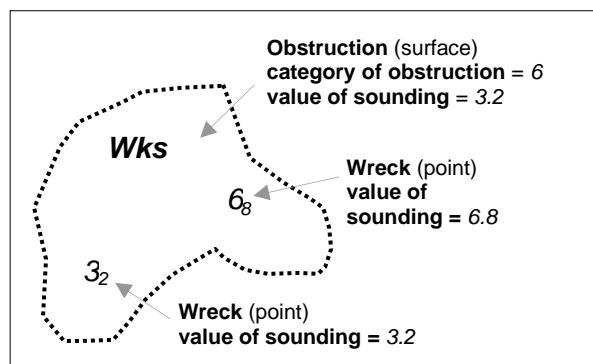


Figure 13-1 – Area of wrecks

13.2 Danger line bordering an area through which navigation is not safe

A danger line, bordering an area through which navigation is not safe, should be encoded using an **Obstruction** feature of type surface, with attribute **category of obstruction** = 6 (foul area).

13.3 Doubtful dangers

The fact that a danger is doubtful should be encoded using the feature attributes **quality of vertical measurement** and **status** and the spatial attribute **quality of horizontal measurement** for the feature:

	quality of horizontal measurement	quality of vertical measurement	status
Position approximate	4		
Position doubtful	4		
Existence doubtful			18
Doubtful sounding		3	
Reported danger	4	8 or 9	

*Table 13-1 – Doubtful dangers – Attribute encoding*Remarks:

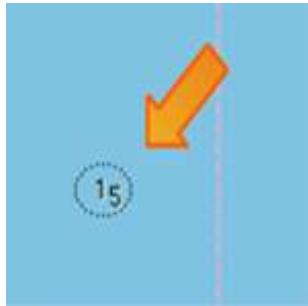
- The same notions of approximate or doubtful positions and doubtful existence also apply to features other than dangers (for example landmarks, buoys).

13.4 Underwater/awash rock

IHO Definition: **UNDERWATER/AWASH ROCK.** A concreted mass of stony material or coral which dries, is awash or is below the water surface. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.194, November 2000).

S-401 Geo Feature: Underwater/Awash Rock (UWTROC, uwtrroc) (C)

Primitives: Point, Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
				
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
exposition of sounding	(EXPSOU)	1 : within the range of depth of the surrounding depth area 2 : shoaler than the range of depth of the surrounding depth area 3 : Deeper Than the Range of Depth of the Surrounding Depth Area	EN	0,1
<i>feature name</i>		See clause 2.5.8	C	0,*
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>nature of surface</i>	(NATSUR)	5 : Stone 9 : Rock 11 : Lava 14 : coral 18 : Boulder	EN	0,1
<i>quality of vertical measurement</i>	(QUASOU)	1 : depth known 2 : depth or least depth unknown 3 : doubtful sounding 4 : unreliable sounding 6 : least depth known 7 : least depth unknown, safe clearance at value shown	EN	0,*

		8 : value reported (not surveyed) 9 : value reported (not confirmed) 10 : Maintained Depth 11 : Not Regularly Maintained		
reported date	(SORDAT)	See clause 2.4.8	TD	0,1
status	(STATUS)	18 : existence doubtful	EN	0,1
<i>technique of vertical measurement</i>	(TECSOU)	1 : found by echo sounder 2 : found by side scan sonar 3 : found by multi beam 4 : found by diver 5 : found by lead line 6 : swept by wire drag 8 : swept by vertical acoustic system 9 : found by electromagnetic sensor 10 : photogrammetry 11 : satellite imagery 12 : found by leveling 13 : swept by side scan sonar 15 : found by LIDAR 16 : synthetic aperture radar 17 : hyperspectral imagery 18 : mechanically swept	EN	0,*
value of sounding	(VALSOU)		RE	1,1
water level effect	(WATLEV)	1 : Partly Submerged at High Water 2 : Always Dry 3 : always under water/ submerged 4 : covers and uncovers 5 : awash 8 : Above Mean Water Level 9 : Below Mean Water Level	EN	1,1
scale minimum	(SCAMIN)	[EUR: 22000, US: 18750] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
<i>default clearance depth</i>		See clause 30.1	RE	0,1 †
surrounding depth			RE	1,1
Vertical Uncertainty	(VERACC)		C	0, 1
Uncertainty Fixed	(POSACC) (SOUACC)	[xx.xx] (metres), e.g., 1.54	(S) RE	1, 1

	(VERACC)			
Uncertainty Variable Factor			(S) RE	0, 1
Category of Temporal Variation	(CATTEV)	4 : Likely to Change 5 : Unlikely to Change 6 : Unassessed	EN	0, 1
Pictorial Representation	(PICREP)		TE	0, 1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0, *
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0, *
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0, *

-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*
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[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

The Inland ECDIS or ECS "system" attribute **default clearance depth** must be populated with a value, which must not be an empty (null) value, if the attribute **value of sounding** is populated with an empty (null) value.

13.4.1 Rocks which may cover

Full details of all dangers to navigation must be encoded except in those areas for which the IENC is clearly inappropriate for navigation. The fullest possible information on clearance depths must be given irrespective of their depths, where known, in preference to making any arbitrary distinction between "dangerous" and "non-dangerous" depths. This will allow boatmasters of all classes of vessels, including deep-draught ships and submarines, to make their own assessments of what is dangerous to them.

Underwater rocks may cover and uncover, may be awash, or may be always underwater.

Population of the attributes **quality of vertical measurement**, **water level effect**, **reported date** and the spatial attribute **quality of horizontal measurement** are described in the Table below:

Rock or coral reef	water level effect	quality of vertical measurement	Comment
Covers and uncovers, depth unknown	4	2 or <undefined>	See Remarks below for population of the attribute exposition of sounding .
Covers and uncovers, depth known	4	any value except 2; or <undefined>	Negative value for value of sounding
Awash	5		
Always submerged, depth unknown	3	2 or <undefined>	See Remarks below for population of the attribute exposition of sounding .
Always submerged, depth known	3	any value except 2; or <undefined>	
Reported, not confirmed	3,4 or 5	9	If available, the year reported should be encoded in reported date . The spatial attribute quality of horizontal measurement should be set to 4 (approximate).

Table 13-2 – Underwater rocks – Attribute encoding

Remarks:

- For rocks which do not cover (islets), see clause 5.4.2.
- All **Underwater/Awash Rock** features should be encoded using one of the above combinations of attributes.
- The minimum depth, if known, over any submerged rock, must be encoded using the attribute **value of sounding**. Where **value of sounding** is populated with an empty (null) value, display of the rock in Inland ECDIS or ECS as an underwater hazard, in accordance with the boatmaster's selected safety depth, will be dependent on the value populated for the Inland

- ECDIS or ECS “system” attribute **default clearance depth** (see clauses 2.4.5.1, 30.1 and 8th bullet below.)
- An instance of the information type **Spatial Quality** (see clause 24.5) may be associated to the rock point geometry, using the association **Spatial Association**, to indicate, where required, that the horizontal position and/or the vertical uncertainty for the rock is of different (higher or lower) accuracy than indicated by the underlying **Quality of Bathymetric Data** Meta feature (see clause 3.8). Where **Spatial Quality** is associated to the rock and **value of sounding** is populated with an empty (null) value, the value for the attribute **vertical uncertainty (uncertainty fixed)** on the associated **Spatial Quality**, where required, must also be populated as empty (null). See also clause 3.8.1.3 (Sounding uncertainty).
 - Where **Underwater/Awash Rock** is encoded, there must be no **Sounding** feature encoded coincident.
 - For surface rock and coral reef features, see clause 12.1.1.
 - When a group of rocks is surrounded by a danger line, each rock should be encoded as a separate **Underwater/Awash Rock** feature covered by an obstruction area feature (**Obstruction** – see clause 13.6).
 - If it is required to encode an **Underwater/Awash Rock** feature where the attribute **value of sounding** populated with an empty (null) value, but the source information indicates the depth of the feature is within the range of the surrounding depth area, the value **exposition of sounding** = 1 (within the range of the surrounding depth area) must be populated in order to avoid the unnecessary display of isolated danger symbols in Inland ECDIS or ECS.

Distinction: Obstruction; Seabed Area; Sounding; Wreck.

Inland specific Encoding Instructions:

- A) A drying height is indicated by a negative value within the attribute **value of sounding** (VALSOU). If this value is not known **value of sounding** (VALSOU)="unknown" shall be encoded.
- B) Rocks and groups of rocks which are a hazard to navigation shall be encoded if the depth of the underwater rock is otherwise not displayed.
- C) If the depth of the **Underwater/Awash Rock** is less than the minimum depth of the surrounding **Depth Area exposition of sounding** (EXPSOU) has to be encoded.

13.5 Wreck

		8 : value reported (not surveyed) 9 : value reported (not confirmed) 10 : Maintained Depth 11 : Not Regularly Maintained		
<i>radar conspicuous</i>	(CONRAD)		BO	0,1
reported date	(SORDAT)	See clause 2.4.8	TD	0,1
status	(STATUS)	7 : temporary 12 : illuminated 13 : historic 16 : watched 17 : unwatched 18 : existence doubtful	EN	0,*
technique of vertical measurement	(TECSOU)	1 : found by echo sounder 2 : found by side scan sonar 3 : found by multi beam 4 : found by diver 5 : found by lead line 6 : Swept by wire drag 8 : swept by vertical acoustic system 9 : found by electromagnetic sensor 10 : photogrammetry 11 : satellite imagery 12 : found by levelling 13 : swept by side scan sonar 15 : found by LIDAR 16 : synthetic aperture radar 17 : hyperspectral imagery 18 : mechanically swept	EN	0,*
value of sounding	(VALSOU)	[xx.x or "unknown"] (metres), e.g., 00.3	RE	0,1 †
<i>visual prominence</i>	(CONVIS)	1 : visually conspicuous 2 : not visually conspicuous 3 : prominent	EN	0,1
water level effect	(WATLEV)	1 : partly submerged at high water 2 : always dry 3 : always under water/submerged 4 : covers and uncovers 5 : awash	EN	1,1
scale minimum	(SCAMIN)	[EUR: 22000, US: 45000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1

text	(INFORM) (NINFORM)		(S) TE	0,1 †
pictorial representation	(PICREP)	See clause 2.4.12.2	TE	0,1
default clearance depth		See clause 30.1	RE	0,1 †
surrounding depth			RE	1,1
Vertical Uncertainty	(VERACC)		C	0, 1
Uncertainty Fixed	(POSACC) (SOUACC) (VERACC)	[xx.xx] (metres), e.g., 1.54	(S) RE	1, 1
Uncertainty Variable Factor			(S) RE	0, 1
Category of Temporal Variation	(CATTEV)	4 : Likely to Change 5 : Unlikely to Change 6 : Unassessed	EN	0, 1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1

name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Structure	Structure/Equipment (see clause 25.12)	Daymark, Distance Mark, Fog Signal, Light All Around, Light Sectored, Notice Mark, Physical AIS Aid to Navigation, Radar Transponder Beacon, Signal Station Traffic, Signal Station Warning	Composition	0,1
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Exactly one of the attributes **category of wreck** or **value of sounding** must be populated.

; **category of wreck** is mandatory if the attribute **height** has been populated with a value.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

The Inland ECDIS or ECS "system" attribute **default clearance depth** must be populated with a value, which must not be an empty (null) value, if the attribute **height** has not been populated and the attribute **category of wreck** is populated or the attribute **value of sounding** is populated with an empty (null) value.

13.5.1 Wrecks

Wrecks must be encoded to whatever depth they are considered to be of interest, also taking account of the needs of submarines and fishing vessels where appropriate. Population of the attributes **category of wreck**, **quality of vertical measurement**, **technique of vertical measurement** and **water level effect** are described in Table 13-3 below.

In the following Table, the symbol '/' indicates that this attribute is not relevant for the wreck instance and therefore must not be encoded. A blank indicates that the encoder may choose a relevant value for the attribute.

Wrecks...	category of wreck	water level effect	quality of vertical measurement	technique of vertical measurement
Showing any part of hull or superstructure (visible at high water)	5	1 or 2	/	/
Showing any part of hull or superstructure (visible at low water)	5	4		
Covers and uncovers	4 or 5	4		
Awash		5		
Only the mast is visible at high water	4 or 5	1	/	/
Only the mast is visible at low water	4	4		
Measured depth		3	1, 6 or <undefined>	
Depth measured and mechanically swept		3	6	18
Depth measured by diver		3	1 or 6	4
Depth unknown, considered dangerous by the responsible producing authority	2	3	2* or <undefined>	/
Depth unknown, not considered dangerous by the responsible producing authority	1	3	2* or <undefined>	/
Depth unknown, with a safe clearance		3	7	/
Distributed remains of wreck	3			
Reported, not confirmed			9	

Table 13-3 – Wrecks – Attribute encoding

All wrecks should be encoded using one of the above combinations of attributes.

* For a wreck where the least depth is unknown, the attribute value 2 (depth or least depth unknown) for **quality of vertical measurement** does not apply to the depth of the seabed near the wreck.

The provision of more quantitative information for wrecks where possible is particularly important in terms of the portrayal of wrecks in Inland ECDIS or ECS, as the classification of wrecks as “dangerous” or “non-dangerous” is not taken into account in Inland ECDIS or ECS when symbolizing **Wreck** features outside **Unsurveyed Area**. This often results in wrecks located in **Depth Area** or **Dredged Area** being symbolized as an obstruction to navigation where they are actually non-dangerous. Where the depth of the wreck is unknown, compilers should consider determining an estimated safe clearance value and populating **quality of vertical measurement** = 7 (least depth unknown, safe clearance at value shown).

Remarks:

- Only one of the attributes **category of wreck** or **value of sounding** must be populated, not both.
- The attribute **height** is only relevant for wrecks having attribute **water level effect** = 1 (partly submerged at high water) or 2 (always dry). Where **height** is populated, the attribute **value of sounding** must not be populated.
- The minimum depth, if known, over any submerged wreck, must be encoded using the attribute **value of sounding**. Where **value of sounding** is populated with an empty (null) value, display of the wreck in Inland ECDIS or ECS as an underwater hazard, in accordance with the boatmaster’s selected safety depth, will be dependent on the value populated for the Inland ECDIS or ECS “system” attribute **default clearance depth** (see clauses 2.4.5.1, 30.1 and 8th bullet below).
- An instance of the information type **Spatial Quality** (see clause 24.5) may be associated to the wreck geometry, using the association **Spatial Association**, to indicate, where required, that the

horizontal position and/or the vertical uncertainty for the wreck is of different (higher or lower) accuracy than indicated by the underlying **Quality of Bathymetric Data** Meta feature (see clause 3.8). Where **Spatial Quality** is associated to the wreck and **height** (when **water level effect** = 1 (partly submerged at high water) or 2 (always dry)) or **value of sounding** is populated with an empty (null) value, the value for the complex attribute **vertical uncertainty (uncertainty fixed)** on the associated **Spatial Quality**, where required, must also be populated as empty (null). See also clause 3.8.1.3.

- For reported, not confirmed wrecks, the date of the report must be populated, where known, using the attribute **reported date**.
- The distributed remains of a wreck must be encoded, where required, as a **Wreck** feature with attribute **category of wreck** = 3 (distributed remains of wreck). Even though the wreck may be safe for surface vessels to navigate over the wreck, it must not be encoded as foul ground (see clause 13.7).
- When encoding a **Wreck** feature, this should include the population of the attributes **value of sounding** and **quality of vertical measurement** where the depth of a wreck is known, or the depth is unknown but an estimated safe clearance can be determined. Where the depth is known, or the depth is unknown but an estimated safe clearance has been determined, it is not required to populate the attribute **category of wreck** = 1 (non-dangerous wreck) or 2 (dangerous wreck), as the boatmaster has the quantitative information in order to determine whether the wreck may be dangerous to their type of vessel.
- If it is required to encode a submerged **Wreck** feature where the attribute **value of sounding** is populated with an empty (null) value, but the source information indicates the depth of the feature is within the range of the surrounding depth area, the value **exposition of sounding** = 1 (within the range of the surrounding depth area) must be populated in order to avoid the unnecessary display of isolated danger symbols in Inland ECDIS or ECS.
- For wrecks visible or partly visible at sounding datum, the height or drying height should be encoded, if known. This helps to distinguish wrecks which are always visible from wrecks which are only visible at low tide.

13.5.1.1 Where a wreck is shown with its true shape (large scale IENCs)

Soundings and heights are often given inside a wreck to show the highest points of the hull or superstructure (for example mast, funnel). If it is required to encode such features, they must be done using:

- A **Wreck** feature of type surface with all populated attributes applying to the highest point of the wreck.
- **Land Elevation** features of type point to encode the features of the wreck that are always dry; the type of each feature (for example mast, funnel) may be encoded using the complex attribute **information** (see clause 2.4.6).
- **Sounding** features to encode the features of wrecks which are always submerged, or cover and uncover; the type of each feature (for example mast, funnel) may be encoded using the complex attribute **information** (see clause 2.4.6), which means that these soundings must be encoded individually.

13.5.1.2 Changing criteria for wrecks

Historically the criteria used for differentiating between “dangerous” and “non-dangerous” wrecks were often based on a threshold value for the estimated depth over the wreck (for example 20 m, 28 m). Criteria have varied between nations and over time (due to the increasing draught of large vessels). The term “nondangerous wreck” may be applied even though a wreck may be dangerous to some vessels capable of navigating in the vicinity. Unfortunately, the boatmaster is not necessarily aware of that fact or that, due to the changing criteria, wrecks encoded as “non-dangerous” may have different meanings. Ideally, therefore, all encoded “dangerous” and “non-dangerous” wrecks having no known depth should be re-assessed.

13.5.2 Historic wrecks

Many nations have designated areas around certain wrecks of historical or cultural (for example sea graves) importance to protect the wrecks from unauthorised interference (for example by diving, salvage or anchoring). Such areas should be encoded on the largest optimum display scale IENC data covering the wreck.

If it is required to encode a restricted area around a historic wreck, it must be done using a **Restricted Area** feature (see clause 17.8), with attribute **category of restricted area** = 10 (historic wreck area).

In addition, the wreck itself should be encoded as a **Wreck** feature, with attribute **status** = 13 (historic).

Distinction: Depth Area; Hulk; Obstruction; Sounding; Underwater/Awash Rock.

Inland specific Encoding Instructions:

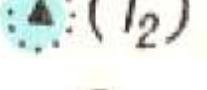
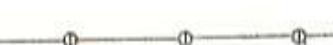
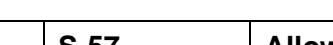
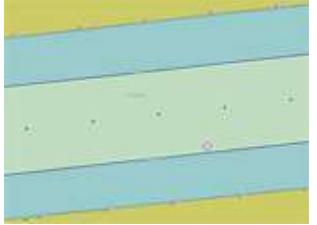
- A) Any wreck in navigable water in- or outside the channel known to exist and confirmed through reliable means, shall be encoded.
- B) **Wrecks** are removed only upon confirmation from reliable means that the **Wreck** does not exist at or near the charted position.
- C) The true or actual location is not needed for removal of the erroneous location.
- D) Use **value of sounding** (VALSOU) only in case **water level effect** (WATLEV) = 3 and indicate the depth of the top end of the **Wreck** referred to the same water level the surrounding depth information is also referred to.
- E) Where a **Wreck** (WRECKS) surface includes other **Wreck** (WRECKS) point features, the encoded values of the attributes **quality of vertical measurement** (QUASOU), **technique of vertical measurement** (TECSOU), **value of sounding** (VALSOU) and **water level effect** (WATLEV) for the surface feature have to be identical to the values for the shallowest point feature.

13.6 Obstruction

IHO Definition: **OBSTRUCTION.** In marine navigation, anything that hinders or prevents movement, particularly anything that endangers or prevents passage of a vessel. The term is usually used to refer to an isolated danger to navigation, such as a sunken rock or pinnacle. (IHO Dictionary – S-32). Examples of obstructions include: snags, stumps, wellheads, diffusers, cribs, fish havens, foul areas, foul grounds, booms, ice booms and ground tackle.

S-401 Geo Feature: Obstruction (OBSTRN) (M)

Primitives: Point, Curve, Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>
	         	

S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of obstruction	(CATOBS)	1 : snag/stump 2 : wellhead 3 : diffuser 4 : crib 5 : fish haven 6 : foul area 8 : ice boom 9 : ground tackle 10 : boom 11 : fishing net 12 : wave energy device 13 : subsurface ocean data acquisition system (ODAS)	EN	0,1

		14 : artificial reef 15 : template 16 : manifold 17 : submerged pingo 18 : remains of platform 19 : scientific instrument 20 : underwater turbine 21 : active submarine volcano 22 : shark net 23 : mangrove		
<i>condition</i>	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
exposition of sounding	(EXPSOU)	1 : within the range of depth of the surrounding depth area 2 : shoaler than the range of depth of the surrounding depth area 3 : deeper than the range of depth of the surrounding depth area	EN	0,1
<i>feature name</i>		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
<i>height</i>	(HEIGHT)		RE	0,1 †
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>maximum permitted draught</i>			RE	0,1
nature of surface	(NATSUR)	1 : mud 2 : clay 3 : silt 4 : sand 5 : stone 6 : gravel 7 : pebbles 8 : cobbles 9 : rock 11 : lava 14 : coral 17 : shells 18 : boulder	EN	0,*
<i>product</i>	(PRODCT)	1 : oil 2 : gas 3 : water 8 : drinking water 23 : electricity	EN	0,*
quality of vertical measurement	(QUASOU)	1 : depth known 2 : depth or least depth unknown 3 : doubtful sounding 4 : unreliable sounding 6 : least depth known	EN	0,*

		7 : least depth unknown, safe clearance at value shown 8 : value reported (not surveyed) 9 : value reported (not confirmed)		
reported date	(SORDAT)	See clause 2.4.8	TD	0,1
status	(STATUS)	1 : permanent 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 13 : historic 18 : existence doubtful 28 : buoyed	EN	0,*
<i>technique of vertical measurement</i>	(TECSOU)	1 : found by echo sounder 2 : found by side scan sonar 3 : found by multi beam 4 : found by diver 5 : found by lead line 6 : swept by wire drag 8 : swept by vertical acoustic system 9 : found by electromagnetic sensor 10 : photogrammetry 11 : satellite imagery 12 : found by levelling 13 : swept by side scan sonar 15 : found by LIDAR 16 : synthetic aperture radar 17 : hyperspectral imagery 18 : mechanically swept	EN	0,*
value of sounding	(VALSOU)	[x.xx m] (metres)	RE	0,1 †
<i>vertical length</i>	(VERLEN)		RE	0,1
water level effect	(WATLEV)	1 : partly submerged at high water 2 : always dry 3 : always under water/ submerged 4 : covers and uncovers 5 : awash 7 : floating	EN	1,1
scale minimum	(SCAMIN)	[EUR: 22000, US: 30000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NIINFORM)		(S) TE	0,1 †
<i>default clearance depth</i>		See clause 30.1	RE	0,1 †

surrounding depth			RE	1,1
Vertical Uncertainty	(VERACC)		C	0, 1
Uncertainty Fixed	(POSACC) (SOUACC) (VERACC)	[xx.xx] (metres), e.g., 1.54	(S) RE	1, 1
Uncertainty Variable Factor			(S) RE	0, 1
Category of Temporal Variation	(CATTEV)	4 : Likely to Change 5 : Unlikely to Change 6 : Unassessed	EN	0, 1
Nature of Construction	(NATCON)	1 : Masonry 2 : Concreted 3 : Loose Boulders 4 : Hard Surfaced 6 : Wooden 7 : Metal 8 : Glass Reinforced Plastic	EN	0, *
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0, *
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM)		(S) TE	1,1

	(NOBJNM)			
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Component	Mooring Trot Aggregation (see clause 25.7)	Mooring Trot	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Exactly one of the attributes **height** or **value of sounding** must be populated.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

The Inland ECDIS or ECS "system" attribute **default clearance depth** must be populated with a value, which must not be an empty (null) value, if the attribute **height** is not populated and the attribute **value of sounding** is populated with an empty (null) value.

13.6.1 Obstructions and foul areas

If it is required to encode features considered to be an obstruction or hazard to surface navigation that cannot be encoded using any other S-401 specific feature (for example **Underwater Rock**, **Wreck**), it must be done using the feature **Obstruction**.

Population of the attributes **quality of vertical measurement**, **technique of vertical measurement** and **water level effect** are described in Table 13-4 below.

In the following Table, the symbol '/' indicates that this attribute is not relevant for the obstruction instance and therefore must not be encoded. A blank indicates that the encoder may choose a relevant value for the attribute.

Obstruction...	water level effect	quality of vertical measurement	technique of vertical measurement
Depth unknown	3 or 4	2* or <undefined>	/
Least depth known	3 or 4	1 or 6	
Mechanically swept to the depth shown	3	6	18
Measured by diver	3	1 or 6	4

Table 13-4 – Obstructions – Attribute encoding

All obstructions should be encoded using one of the above combinations of attributes.

* For an obstruction where the least depth is unknown, the attribute value 2 (depth or least depth unknown) for **quality of vertical measurement** does not apply to the depth of the seabed near the obstruction.

It is important when encoding obstructions to be aware of the distinction between attribute value **category of obstruction** = 6 (foul area) and foul ground:

Foul areas are defined as areas of numerous uncharted dangers to navigation. When encoded on IENC, **Obstruction** features of type surface with attribute **category of obstruction** = 6 (foul area) will display in the Inland ECDIS or ECS “base display” as an obstruction to navigation, with all associated alarms to indicate that it is unsafe for vessels to enter or transit the area.

Foul ground is defined as an area over which it is safe to navigate but which should be avoided for anchoring, taking the ground or ground fishing. When encoded on IENC, **Foul Ground** features (see clause 13.7) of type surface will display in the Inland ECDIS or ECS “other” display as a “foul area of seabed safe for navigation but not for anchoring”, indicating to the boatmaster that it is safe to enter or transit the area but hazardous to take the ground or undertake other subsurface activities.

In some cases areas on the source indicated to be foul ground have been misinterpreted as foul areas, which has resulted in encoding in IENC of **Obstruction** with **category of obstruction** = 6 (foul area). This encoding results in the incorrect indication in the Inland ECDIS or ECS that the area is unsafe for navigation, which is potentially confusing to the boatmaster.

Foul ground, over which it is safe to navigate but which should be avoided for anchoring, taking the ground or ground fishing, should be encoded using a **Foul Ground** feature (see clause 13.7). Although the source may depict a “Foul Area”, it should be determined whether it is in fact “Foul Ground” before encoding the appropriate feature.

Remarks:

- Only one of the attributes **height** or **value of sounding** must be populated, not both.
- The minimum depth, if known, over any submerged obstruction, must be encoded using the attribute **value of sounding**. Where **value of sounding** is populated with an empty (null) value, display of the obstruction in Inland ECDIS or ECS as an underwater hazard, in accordance with the boatmaster’s selected safety depth, will be dependent on the value populated for the Inland ECDIS or ECS “system” attribute **default clearance depth** (see clauses 2.4.5.1, 30.1 and 12th bullet below).
- Where obstructions such as fish havens have a declared maximum authorised draught for vessels passing over the feature, this must be populated, where known, using the attribute **maximum permitted draught**.
- The attribute **height** must be populated for **Obstruction** features having attribute **water level effect** = 1 (partly submerged at high water) or 2 (always dry).
- **Obstruction** features having attribute **water level effect** = 7 (floating) must have the attribute **height** populated with an empty (null) value.
- The attribute **vertical length** is used to populate the distance of an obstruction above the seabed; or the height of a floating obstruction above the waterway surface.
- An instance of the information type **Spatial Quality** (see clause 24.5) may be associated to the obstruction geometry, using the association **Spatial Association**, to indicate, where required, that the horizontal position and/or the vertical uncertainty for the obstruction is of different (higher or lower) accuracy than indicated by the underlying **Quality of Bathymetric Data** Meta feature (see clause 3.8). Where **Spatial Quality** is associated to the obstruction and **height** or **value of sounding** is populated with an empty (null) value, the value for the attribute **vertical uncertainty (uncertainty fixed)** on the associated **Spatial Quality**, where required, must also be populated as empty (null). See also clause 3.8.1.3 (Sounding uncertainty).
- For reported, not confirmed obstructions, the date of the report must be populated, where known, using the attribute **reported date**.

- If the nature of a dangerous underwater feature, dangerous underwater area, or floating feature is not explicitly known, it must be encoded using **Obstruction**.
- An **Obstruction** feature of type surface must be covered by a surface feature from Skin of the Earth as appropriate.
- An area containing numerous dangers, through which navigation is not safe at the optimum display scale for the IENC data, should be encoded using an **Obstruction** feature of type surface, with attribute **category of obstruction** = 6 (foul area).
- If it is required to encode a submerged **Obstruction** feature where the attribute **value of sounding** is populated with an empty (null) value, but the source information indicates the depth of the feature is within the range of the surrounding depth area, the value **exposition of sounding** = 1 (within the range of the surrounding depth area) must be populated in order to avoid the unnecessary display of isolated danger symbols in Inland ECDIS or ECS.
- Active submarine volcanos can be a significant navigational hazard; and harmful concentrations of volcanic gases emanating from active submarine volcanos can cover an extensive. If it is required to encode an active submarine volcano, it must be done using an **Obstruction** feature of type point, with attributes **category of obstruction** = 21 (active submarine volcano), **exposition of sounding** = 2 (shoaler than the range of depth of the surrounding depth area) and **quality of vertical measurement** = 2 (depth or least depth unknown). To indicate the unpredictable nature of the volcano (it may be periodically submerged or extend above the surface), the mandatory attributes **value of sounding** and **water level effect** must be populated with an empty (null) value. In order to raise the level of indication of the hazard in the Inland ECDIS or ECS to the boatmaster so as to generate an alarm, a small **Depth Area** feature having attribute **depth range minimum value** = 0 may also be encoded. The area that can be potentially covered by harmful volcanic gases, which may cover an area of up to 10 NM from the volcano, should be encoded using a **Caution Area** feature (see clause 16.11), having the complex attribute **information** (see clause 2.4.6), sub-attributes **text** = *Volcanic activity* and **file reference** carrying a reference to an appropriate cautionary note similar to:

Active submarine volcanos exist in this area. Some volcanos have been reported to erupt breaking the surface of the sea and projecting ashes, other volcanic materials and harmful gases into the air. Changes to charted depths, uplifting of reefs and emerging of volcanic islets may occur throughout the area. Due to the unpredictable nature of these events Mariners are strongly recommended to avoid the area.

- Inactive submarine volcanos must be encoded, if required, using a **Sea Area** feature (see clause 9.1).
- Platforms which have been cut-off above the seabed must be encoded as **Obstruction**, while platforms which have been cut-off to the level of the seabed should be encoded as **Foul Ground** (see clause 13.7).
- In certain circumstances where an obstruction is always dry (for example cribs), it must be covered by a **Land Area** feature.
- Features that are considered to be subsurface Fish Aggregating Devices (FAD) must be encoded as **Obstruction**, with **category of obstruction** = 5 (fish haven), unless the feature is a vessel that has been deliberately sunk to perform the function of a fish haven, which should be encoded as a **Wreck** feature (see clause 13.5).
- If it is required to encode a subsurface ocean data acquisition system (ODAS), whether on the seabed or suspended in the water column by a subsurface float, it must be done using **Obstruction** with **category of obstruction** = 14 (subsurface ocean data acquisition system (ODAS)). An ODAS buoy must be encoded as a **Special Purpose/General Buoy** feature (see clause 20.5).

13.6.1.1 Mangroves

Where the source indicates that a mangrove area is in the intertidal area, an **Obstruction** feature of type area, with attribute **category of obstruction** = 23 (mangrove) should be encoded on top of the portion of the intertidal area (**Depth Area** with attributes **depth range minimum value** = -H and **depth range maximum value** = 0 – see clause 11.6.3) where the mangrove coverage exists. The mandatory attribute **water level effect** should be populated with 1 (partially submerged at high water); and the

conditional mandatory attribute **height** populated with the approximate altitude of the highest point of the top of the mangroves if known or an empty (null) value if not. The seaward spatial type(s) of the mangrove area should be associated to an instance of the information type **Spatial Quality** (see clause 24.5) having the attribute **quality of horizontal measurement** = 4 (approximate). The landward edge of the mangrove area representing the high water line should be encoded as **Coastline** (see clause 5.3), having no value populated for the attribute **category of coastline**, and no value for **quality of horizontal measurement** on the related spatial type(s).

If it is required to encode an individual mangrove tree within the intertidal area, this must be done using an **Obstruction** feature of type point, with attribute **category of obstruction** = 23 (mangrove).

Where mangrove areas are required to be generalised on smaller optimum display scale IENC datasets such that the seaward edge of the mangrove only is to be indicated as the “apparent” coastline, this must be done using the feature **Coastline** (see clause 5.3).

Remarks:

- The encoding of **Obstruction** of type curve and having attribute **category of obstruction** = 23 (mangrove) is prohibited.

Distinction: Depth Area; Fishing Facility; Foul Ground; Marine Farm/Culture; Underwater/awash Rock; Water Turbulence; Wreck.

Inland specific Encoding Instructions:

- A) Bank and shoal at a small scale are encoded as a point feature **Obstruction** (OBSTRN). Depth above the bank relative to the project water level is encoded by attribute **value of sounding** (VALSOU).
- B) Limits of obstruction are encoded as a spatial feature (edge). The obstruction itself is encoded as a point feature **Obstruction** (OBSTRN) with attribute **category of obstruction** (CATOBS) set to corresponding value.
- C) Group of rocks is encoded as a surface feature **Obstruction** (OBSTRN) with attribute **nature of surface** (NATSUR) = 9 (rocky).
- D) Underwater obstruction at a large scale is encoded as a surface feature **Obstruction** (OBSTRN) with attribute **category of obstruction** (CATOBS) set to corresponding value. Depth above the obstruction relative to the project water level is encoded by attribute **value of sounding** (VALSOU).
- E) Underwater obstruction at a small scale is encoded as a point feature **Obstruction** (OBSTRN) with attribute **category of obstruction** (CATOBS) set to corresponding value. Depth above the obstruction relative to the project water level is encoded by attribute **value of sounding** (VALSOU).
- F) Pile under-water is encoded as a point feature **Obstruction** (OBSTRN) with attribute **category of obstruction** (CATOBS) set to 1 (snag) and attribute **water level effect** (WATLEV) set to 3 (always under water).
- G) Crib obstruction above-water is encoded as a point feature **Obstruction** (OBSTRN) with attribute **category of obstruction** (CATOBS) set to 4 (crib) and attribute **water level effect** (WATLEV) set to 2 (always dry).
- H) Pile obstruction above-water is encoded as a point feature **Obstruction** (OBSTRN) with attribute **category of obstruction** (CATOBS) set to 1 (snag) and attribute **water level effect** (WATLEV) set to 2 (always dry).
- I) Crib obstruction under-water is encoded as a point feature **Obstruction** (OBSTRN) with attribute **category of obstruction** (CATOBS) set to 4 (crib) and attribute **water level effect** (WATLEV) set to 3 (always under water).

- J) Pile obstruction under-water is encoded as a point feature **Obstruction** (OBSTRN) with attribute **category of obstruction** (CATOBS) set to 1 (snag) and attribute **water level effect** (WATLEV) set to 3 (always under water).
- K) Snags, stumps, wellheads, diffusers, fish havens, foul areas, foul grounds, booms, ice booms and ground tackle should be encoded as **Obstruction** (OBSTRN), if they endanger or prevent the passage of vessels.
- L) Diffusers are encoded as **Obstruction** (OBSTRN) with **category of obstruction** (CATOBS) = 3 (diffuser).
- M) If the nature of a dangerous underwater object, dangerous underwater area, or floating object is not explicitly known, it must be encoded as an **Obstruction** (OBSTRN).
- N) Where an **Obstruction** (OBSTRN) surface includes other **Obstruction** (OBSTRN) point features, the encoded values of the attributes **value of sounding** (VALSOU) and **water level effect** (WATLEV) for the surface feature have to be identical to the values for the shallowest point feature.
- O) Fishing net obstruction above-water is encoded as a curve or surface feature **Obstruction** (OBSTRN) with attribute **category of obstruction** (CATOBS) set to 11 (fishing net) and attribute **water level effect** (WATLEV) set to 2 (always dry).

13.7 Foul ground

IHO Definition: **FOUL GROUND.** Areas over which it is safe to navigate but which should be avoided for anchoring, taking the ground or ground fishing. (IHO Dictionary – S-32).

S-401 Geo Feature: Foul Ground (OBSTRN) (M)

Primitives: Point, Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
<i>feature name</i>		See clause 2.5.8	C	0,*
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>quality of vertical measurement</i>	(QUASOU)	2 : depth known 2 : depth or least depth unknown 3 : doubtful sounding 4 : unreliable sounding 6 : least depth known 7 : least depth unknown, safe clearance at value shown 8 : value reported (not surveyed) 9 : value reported (not confirmed)	EN	0,*
<i>reported date</i>	(SORDAT)	See clause 2.4.8	TD	0,1
<i>status</i>	(STATUS)	5 : historic 18 : existence doubtful 28 : buoyed	EN	0,*
<i>technique of vertical measurement</i>	(TECSOU)	6 : found by echo sounder 2 : found by side scan sonar 7 : found by multi beam 8 : found by diver 9 : found by lead line 6 : found by wire drag 8 : swept by vertical acoustic system 9 : found by electromagnetic sensor 10 : photogrammetry 11 : satellite imagery 12 : found by levelling	EN	0,*

		10 : swept by side scan sonar 11 : found by LIDAR 12 : synthetic aperture radar 13 : hyperspectral imagery 18 : mechanically swept		
value of sounding	(VALSOU)		RE	0,1
<i>vertical uncertainty</i>	(SOUACC)		C	0,1
uncertainty fixed			(S) RE	1,1
uncertainty variable factor			(S) RE	0,1
Water Level Effect	(WATLEV)	14 : Always Under Water/Submerged 15 : Covers and Uncovers 5 : Awash	EN	0, 1
scale minimum	(SCAMIN)	[EUR: 22000, US: 30000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
exposition of sounding	(EXPSOU)	16 : within the range of depth of the surrounding depth area 2 : shoaler than the range of depth of the surrounding depth area 3 : deeper than the range of depth of the surrounding depth area	EN	0,1
Category of Temporal Variation	(CATTEV)	17 : Likely to Change 18 : Unlikely to Change 6 : Unassessed	EN	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
Category of Authority		2 : Border Control 19 : Police 20 : Port	(S) EN	0, 1

		<p>6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental</p> <p>16 : Customs</p> <p>21 : Immigration 22 : Fishery 23 : Finance 24 : Maritime</p>		
.....Country Name			(S) TE	0, 1
Source Type		<p>25 : Law or Regulation</p> <p>2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services</p> <p>26 : News Media</p> <p>14 : Traffic Data</p>	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		<p>27 : default name display</p> <p>2 : alternate name display</p>	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

† Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

13.7.1 Foul ground

If it is required to encode an area where seabed operations are unsafe, but over which it is safe to navigate for surface vessels, it must be done using the feature **Foul Ground**. Such areas are distinct from the feature **Obstruction**, attribute **category of obstruction** = 6 (foul area), where navigation is considered to be unsafe for surface vessels (see clause 13.6).

It is important when encoding foul ground to be aware of the distinction between foul ground and the feature **Obstruction**, attribute **category of obstruction** = 6 (foul area) :

Foul ground is defined as an area over which it is safe to navigate but which should be avoided for anchoring, taking the ground or ground fishing. When encoded on IENC, **Foul Ground** features of type surface will display in the Inland ECDIS or ECS “other” display as a “foul area of seabed safe for navigation but not for anchoring”, indicating to the boatmaster that it is safe to enter or transit the area but hazardous to take the ground or undertake other subsurface activities.

Foul areas are defined as areas of numerous uncharted dangers to navigation. When encoded on IENC, **Obstruction** features of type surface with attribute **category of obstruction** = 6 (foul area) will display in the Inland ECDIS or ECS “base display” as an obstruction to navigation, with all associated alarms to indicate that it is unsafe for vessels to enter or transit the area.

It is recommended that if there is any doubt as to whether a feature should be encoded as **Obstruction** or **Foul Ground**, preference should be given to encoding the feature as **Obstruction** (see clause 13.6).

Remarks:

- For reported, not confirmed foul ground, the date of the report must be populated, where known, using the attribute **reported date**.
- A **Foul Ground** feature of type surface must be covered by a surface feature from Skin of the Earth as appropriate (**Depth Area**, **Dredged Area** or **Unsurveyed Area**).
- Platforms which have been cut-off to the level of the seabed should be encoded as **Foul Ground**, while platforms which have been cut-off above the seabed must be encoded as **Obstruction** (see clause 13.6).
- The distributed remains of wrecks must be encoded using the feature **Wreck** (see clause 13.5), and must not be encoded as **Foul Ground**.

Distinction: Depth Area; Fishing Facility; Marine Farm/Culture; Obstruction; Seabed Area; Underwater/Awash Rock; Water Turbulence; Wreck.

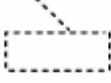
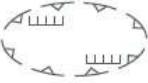
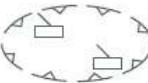
Inland specific Encoding Instructions:

13.8 Fishing facility

IHO Definition: **FISHING FACILITY.** A structure for fishing purposes which can be an obstruction to ships in general. The position of these structures may vary frequently over time. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.70, November 2000, as amended).

S-401 Geo Feature: Fishing Facility (FSHFAC) (O)

Primitives: Point, Curve, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol
	 	   
	Fish traps	

S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of fishing facility	(CATFIF)	1 : fishing stake 2 : fish trap 3 : fish weir 4 : tunny net	EN	0,1
condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
interoperability identifier		MRN (see clause 27.161)	URN	0,1
periodic date range		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
reported date	(SORDAT)	See clause 2.4.8	TD	0,1

status	(STATUS)	1 : permanent 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 12 : illuminated 18 : existence doubtful 28 : buoyed	EN	0,*
vertical length	(VERLEN)	[xxx.x] (metres), e.g., 1.5	RE	0,1
scale minimum	(SCAMIN)	[22000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *

<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Structure	Structure/Equipment (see clause 25.12)	Daymark, Distance Mark, Fog Signal, Light All Around, Light Sectored, Notice Mark, Physical AIS Aid to Navigation, Radar Transponder Beacon, Signal Station Traffic, Signal Station Warning	Composition	0,1
The Component	Aids to Navigation Association (see clause 25.225.2)	Fairway System, Traffic Separation Scheme, Two-Way Route	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

13.8.1 Fishing facilities

Fishing facilities are usually sited in shallow water, but tunny nets are often located in deeper water. They can be very large and extend up to several miles offshore; and form an obstruction to navigation.

If it is required to encode a fishing facility it must be done using the feature **Fishing Facility**.

Remarks:

- The attribute **vertical length** is used to populate the distance of the facility above the seabed.
- Certain types of fishing facilities such as tunny nets in deep water may be an obstruction to navigation. If **Fishing Facility** features are considered to be an obstruction or hazard to navigation, they should also be encoded with an **Obstruction** feature (see clause 13.6). Although this is contrary to IENC encoding principles (that is, double encoding), this solution is recommended for portraying dangers to navigation of this nature in the Inland ECDIS or ECS.
- Floating fish aggregating devices (FAD) must be encoded, where required, as **Special Purpose/General Buoy** features (see clause 20.5). Subsurface FADs (fish havens) must be encoded, where required, as **Obstruction** features (see clause 13.6).

Distinction: Marine Farm/Culture; Obstruction.

Inland specific Encoding Instructions:

13.9 Marine farm/culture

IHO Definition: **MARINE FARM/CULTURE.** An assemblage of cages, nets, rafts and floats or posts where fish, including shellfish, are artificially cultivated. (IHO Dictionary – S-32).

S-401 Geo Feature: Marine Farm/Culture (MARCUL) (C)

Primitives: Point, Curve, Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of marine farm/culture	(CATMFA)	1 : crustaceans 2 : edible bivalve molluscs 3 : fish 4 : seaweed 5 : pearl culture farm	EN	1,1
exposition of sounding	(EXPSOU)	1 : within the range of depth of the surrounding depth area 2 : shoaler than the range of depth of the surrounding depth area 3 : Deeper Than the Range of Depth of the Surrounding Depth Area	EN	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
height	(HEIGHT)		RE	0,1 [†]
interoperability identifier		MRN (see clause 27.161)	URN	0,1
periodic date range		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1

quality of vertical measurement	(QUASOU)	1 : depth known 2 : depth or least depth unknown 3 : doubtful sounding 4 : unreliable sounding 6 : least depth known 7 : least depth unknown, safe clearance at value shown 8 : value reported (not surveyed) 9 : value reported (not confirmed)	EN	0,*
restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 7 : entry prohibited 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 14 : area to be avoided 15 : construction prohibited 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transhipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 26 : landing prohibited 27 : speed restricted 28 : Overtaking Prohibited 29 : Overtaking of Convoys by Convoys Prohibited 30 : Passing or Overtaking Prohibited 31 : Berthing Prohibited 32 : Berthing Restricted 33 : Making Fast Prohibited 34 : Making Fast Restricted 35 : Turning Prohibited 36 : Restricted Fairway Depth 37 : Restricted Fairway Width 38 : Use of Spuds Prohibited 39 : swimming prohibited 40 : SOx Emission Restricted 41 : NOx Emission Restricted	EN	0,*

		43 : Passing or Overtaking of Convoys by Convoys Prohibited		
status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 14 : public 16 : watched 17 : unwatched 28 : buoyed	EN	0,*
value of sounding	(VALSOU)		RE	0,1 †
<i>vertical length</i>	(VERLEN)		RE	0,1
vertical uncertainty			C	0,1
uncertainty fixed	(SOUACC)	[xx.x]	(S) RE	1,1
uncertainty variable factor			(S) RE	0,1
<i>vessel speed limit</i>			C	0,*
speed limit			(S) RE	1,1
speed units		2 : kilometres per hour 3 : miles per hour 4 : knots	(S) EN	1,1
vessel class			(S) TE	0,1
water level effect	(WATLEV)	1 : partly submerged at high water 2 : always dry 3 : always under water/submerged 4 : covers and uncovers 5 : awash 7 : floating	EN	1,1
scale minimum	(SCAMIN)	[260000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFOM)		(S) TE	0,1 †
Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration	(S) EN	0, 1

		6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Exactly one of the attributes **height** or **value of sounding** must be populated.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

13.9.1 Marine farms

Marine farms are collections of cages, nets, rafts and floats, or posts, where fish, including shellfish, are reared. They may obstruct navigation, and are likely to be marked by buoys and possibly lights. They are not always confined to inshore locations. Shellfish beds are found in shallow water. Depending on vessel draught and tidal range, it is usually possible to navigate over them, at high water, but they can be damaged by vessels anchoring or grounding on them.

If it is required to encode a marine farm, it must be done using the feature **Marine Farm/Culture**.

Remarks:

- When it is required to encode the minimum depth of the feature, the attributes **exposition of sounding** and **quality of vertical measurement** and the mandatory attribute **value of sounding** must be used. When a **Marine Farm/Culture** feature covers an area of the seafloor at the optimum display scale of the data, the value of the attribute **value of sounding** represents the minimum depth, if known, over any structure used to form or support the marine farm, or within the area of the marine farm itself. The mandatory attribute **water level effect** must be used to encode the water level of the shallowest section of the area, if partly or completely under water.
- For additional guidance regarding the encoding of vessel speed limits, see clause 17.4.
- The attribute **height** must be populated for **Marine Farm/Culture** features having attribute **water level effect** = 1 (partly submerged at high water) or 2 (always dry).
- The attribute **vertical length** is used to populate the distance of the marine farm above the seabed.
- Where required, ground tackle associated with marine farms must be encoded as **Obstruction** features (see clause 13.6).

13.9.2 Fish havens

If it is required to encode a fish haven, it must be done using an **Obstruction** feature (see clause 13.6), with attribute **category of obstruction** = 5 (fish haven).

Distinction: Fishing Facility; Obstruction.

Inland specific Encoding Instructions:

- A) If **value of sounding** (VALSOU) is provided **vertical uncertainty** (SOUACC) and **vertical datum** (VERDAT) should also be provided.
- B) Use **status** (STATUS) if any of the conditions apply.
- C) Marine Farms/Cultures in navigable waters shall be encoded.

14 Geo Features – Offshore Installations

14.1 Offshore platform

<p>IHO Definition: OFFSHORE PLATFORM. A permanent offshore structure, either fixed or floating. (Adapted from IHO Dictionary – S-32).</p> <p>S-401 Geo Feature: Offshore Platform (OFSPLF) (C)</p> <p>Primitives: Point, Surface</p>				
<i>Real World</i> 	<i>Paper Chart Symbol</i> 		<i>Inland ECDIS or ECS Symbol</i> 	
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of offshore platform	(CATOPP)	1 : oil rig 2 : production platform 3 : observation/research platform 4 : articulated loading platform 5 : single anchor leg mooring 6 : mooring tower 7 : artificial island 8 : floating production, storage and off-loading vessel 9 : accommodation platform 10 : navigation, communication and control buoy 11 : floating oil tank	EN	1,1
colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,* (ordered)
colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1 [†]

condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
flare stack	(LNDMRK)		BO	0,1
height	(HEIGHT)	[xxx.x] metres, e.g., 27.4	RE	0,1
interoperability identifier		MRN (see clause 27.161)	URN	0,1
product	(PRODCT)	1 : oil 2 : gas 3 : water 18 : liquefied natural gas 19 : liquefied petroleum gas 23 : electricity	EN	0,*
radar conspicuous	(CONRAD)		BO	0,1
reported date	(SORDAT)	See clause 2.4.8	TD	0,1
status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 7 : temporary 8 : private 12 : illuminated 16 : watched 17 : un-watched 28 : buoyed	EN	0,*
vertical length	(VERLEN)	[xxx.x] (metres), e.g., 0.5	RE	0,1
visual prominence	(CONVIS)	1 : visually conspicuous 2 : not visually conspicuous 3 : prominent	EN	0,1
Water Level Effect	(WATLEV)	1 : partly submerged at high water 2 : always dry 3 : always under water/ submerged 4 : covers and uncovers 5 : awash 7 : floating	EN	1, 1
scale minimum	(SCAMIN)	[EUR: 45000, US: 60000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1

language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 [†]
pictorial representation	(PICREP)	See clause 2.4.12.2	TE	0,1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity

The Structure	Structure/Equipment (see clause 25.12)	Bollard, Daymark, Distance Mark, Fog Signal, Helipad, Light Air Obstruction, Light All Around, Light Sectored, Notice Mark, Physical AIS Aid to Navigation, Radar Transponder Beacon, Signal Station Traffic, Signal Station Warning	Composition	0,1
The Component	Aids to Navigation Association (see clause 25.2)	Fairway System, Traffic Separation Scheme, Two-Way Route	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] The attribute **colour pattern** is mandatory for offshore platforms that have more than one value populated for the attribute **colour**.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

14.1.1 Offshore platforms

Several different types of platforms are in use. They are normally piled steel or concrete structures, the latter held in position on the seafloor by gravity. Tension Leg Platforms (TLP) consist of semi-submersible platforms secured to flooded caissons on the seafloor vertically below them by wires kept in tension by the buoyancy of the platform.

Platforms may serve a number of purposes. They may carry any of the following equipment: drilling and production equipment; oil and gas separation and treatment plants; pump-line stations; and electricity generators. They may be fitted with cranes, a helicopter landing deck, and accommodation for up to 350 people. Platforms may stand singly or in groups connected by pipelines. Some stand close together in a complex, with bridges and underwater cables connecting them. Unwanted gas or oil is sometimes burnt from a flaring boom extending from the platform or from a nearby flare stack.

If it is required to encode a permanent offshore platform, it must be done using the feature **Offshore Platform**.

Remarks:

- The attribute **height** is only relevant for fixed platforms, and is referred to the vertical datum (see clause 2.5.7).
- The attribute **vertical length** is only relevant for floating platforms, and is referred to the waterlevel.
- If it is required to encode sites of dismantled platforms, this must be done using **Foul Ground** features (see clause 13.7), unless the source indicates that any remaining structure protrudes far

enough above the seabed so as to be an obstruction to surface navigation, in which case this must be encoded using an **Obstruction** feature (see clause 13.6).

- Platforms may carry lights (see Section 19), fog signals (see clause 20.16), helicopter landing pads (see clause 6.5) and flare stacks. Where fitted, lights should be encoded as described in Section 19, with the **Offshore Platform** being used as the structure feature for the light equipment feature(s).

14.1.2 Wellheads

In the course of developing an oil or gas field, numerous wells may be drilled. Some, which will not be required again, may be sealed at or below the seafloor and abandoned; such wells must not be encoded, as they have no relevance to navigation.

A submerged wellhead is a submarine structure projecting some distance above the seafloor and capping a temporarily abandoned (or “suspended”) oil or gas well. Their associated pipes and other equipment usually project some 2 - 6 metres, but in some cases as much as 15 metres, above the seafloor. Some may be covered by steel cages to avoid snagging trawling gear. In certain instances, a wellhead may project above the sea surface. Wellheads must be encoded on at least the largest optimum display scale ENC data, together with associated buoys, as a hazard to fishing and, dependent on depth, as a hazard to deep-draught vessels and towed structures.

If it is required to encode wellheads, this must be done using **Obstruction** features of type point (see clause 13.6), with attributes:

category of obstruction	- 2 - wellhead
height	
status	- 4 - not in use (disused)
value of sounding	
vertical length	- vertical length of the wellhead above the seabed
water level effect	- 2 - always dry (for wellheads that protrude at high water) - 3 - always under water/submerged

14.1.3 Offshore safety zones

Under UNCLOS, a coastal State may establish safety zones around artificial islands, installations and structures in their EEZ and on their continental shelf. These installations include drilling rigs, production platforms, wellheads, moorings and other associated structures. Safety zones normally extend 500 metres from the outermost points of the installations. Within these zones, appropriate measures can be taken to ensure the safety of navigation and of the installations.

If it is required to encode an offshore safety zone, it must be done using a **Restricted Area** feature (see clause 17.8), with attribute **category of restricted area** = 1 (offshore safety zone).

14.1.4 Offshore flare stacks

As with refineries on land, offshore terminals may burn off gas from production platforms or from “flare stacks” set up as separate structures at a short distance from the production platforms.

If it is required to indicate the presence of a flare stack on an offshore platform, it must be done through population of the Boolean attribute **flare stack** = *True*.

Remarks:

- Flare stacks on land must be encoded, if required, using a **Landmark** feature (see clause 7.2).

Distinction: Hulk; Landmark; Installation Buoy; Offshore Production Area; Wind Turbine.

Inland specific Encoding Instructions:

- A) EUR: Offshore platforms shall be encoded.

14.2 Submarine cable

IHO Definition: **SUBMARINE CABLE.** An assembly of wires or fibres, or a wire rope or chain, which has been laid underwater or buried beneath the seafloor. (IHO Dictionary – S-32).

S-401 Geo Feature: Cable Submarine (CBLSUB) (C)

Primitives: Curve

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>
		

S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
<i>buried depth</i>	(BURDEP)		RE	0,1
<i>category of cable</i>	(CATCBL)	1 : power line 3 : transmission line 4 : telephone 5 : telegraph 6 : mooring cable 7 : ferry 8 : fibre optic cable 9: junction cable 10 : telecommunications cable	EN	0,1
<i>condition</i>	(CONDTN)	1 : under construction 5 : planned construction	EN	0,1
<i>feature name</i>		See clause 2.5.8	C	0,*
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
<i>fixed date range</i>		See clause 2.4.8	C	0,1
<i>date end</i>	(DATEND)		(S) TD	0,1 [†]

date start	(DATSTA)		(S) TD	0,1 †
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
status	(STATUS)	1 : permanent 4 : not in use 5 : periodic/intermittend 13 : historic 18 : existence doubtful	EN	0,*
scale minimum	(SCAMIN)	[EUR: 22000, US: 60000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NIINFOM)		(S) TE	0,1 †
Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media	(S) EN	0, 1

		14 : Traffic Data		
.....Source	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Component	Mooring Trot Aggregation (see clause 25.7)	Mooring Trot	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

14.2.1 Submarine cables

Submarine cables are used to carry power or telecommunications. All power cables and most telecommunication cables carry dangerous voltages. Submarine cables are potential hazards to both vessels and life, particularly to fishing vessels engaged in trawling the seabed. Where possible, submarine cables are now buried beneath the seafloor in water depths of less than 1000 metres; however there remains a large percentage unburied. Submarine cables are vulnerable to damage from anchoring, trawling or other seabed operations; even small craft anchors can penetrate a soft seabed sufficiently to foul a cable. Damage to telecommunication cables can lead to extensive disruption of national and international communications, whilst damage to power cables can disrupt electricity supply.

Submarine cables, including disused cables, should be encoded to indicate their presence to vessels engaged in anchoring, trawling or seabed activities in order to:

- Warn boatmasters of the potential hazard to their vessel, including electric shock to any vessel fouling or breaking the cable, possible capsizing of a small vessel if its fishing gear or anchor is trapped under the cable, or loss of gear (trawls or anchor cables).
- Prevent damage to the cable and avoid disrupting the service the cable may be providing.

Active cables should be encoded to a depth of 2000 metres (which is the deepest depth of water to which vessels may be endangered by fouling the cable).

If it is required to encode a submarine cable, it must be done using the feature **Cable Submarine**.

Remarks:

- If the buried depth varies along the cable, the cable must be encoded as several features.
- Telecommunications cables such as telephone and optic fibre cable must be populated, where required, by populating attribute **category of cable** = 10 (telecommunications cable).
- Where a cable is disused, it should be encoded with the attribute **status** = 4 (not in use), and the attribute **category of cable** should not be encoded. Few disused cables are recovered and so to encode them all would lead to clutter in the data. Also, accurate records of their positions are likely to be incomplete (some cables having been cut or dragged out of position), so there is a case for encoding them very selectively. Where disused cables traverse possible anchorages or where there is known seabed activity, for example trawling grounds, they should be encoded on the largest optimum display scale IENC data covering the area, provided they do not obscure more important information.
- If it is required to provide the contact details of cable owners/operators (in cases of damage to a cable or for reparation for loss of an anchor in order to avoid such damage), this must be done using an associated instance of the information type **Contact Details** (see clause 24.1).
- Cables, buried so deep that they are not vulnerable to damage from anchoring, should not be encoded (so that boatmasters are not unnecessarily inhibited from anchoring or fishing). In marginal cases they may be encoded as **Cable Submarine** with the nominal depth to which they are buried encoded using the attribute **buried depth**.
- For encoding cables for mooring trot, see clause 8.23.
- **Distinction:** Cable Overhead; Cable Area.

Inland specific Encoding Instructions:

- A) Only cables or cable areas where anchoring is prohibited need to be encoded.
- B) **Cable Submarine** features should be encoded just inside the shoreline to minimize clutter.
- C) If there are multiple cables in the same area, do not code as **Cable Submarine** (CBLSUB), but as a **Submarine Cable Area** (CBLARE) (see 14.3)
- D) EUR: If there is an anchoring prohibited notice mark this should be encoded by an anchoring prohibited **Notice Mark** (notmrk) feature (see 20.17).
- E) EUR: If there is a notice mark indicating the presence of a submarine cable this may be encoded by an anchoring prohibited **Notice Mark** (notmrk) feature (see 20.17). If such a notice mark is positioned in the waterway, it must be encoded.
- F) US: Create **Caution Area** (CTNARE) feature buffering the cable 20 metres upstream and downstream of the cable with **information text** (INFORM) cable buffer zone.
- G) Use **status** (STATUS) = 18 (existence doubtful) in the case where the existence of the feature cannot be confirmed.
- H) **feature name** (OBJNAM) should be used for the name of the owner.

14.3 Submarine cable area

IHO Definition: **SUBMARINE CABLE AREA.** An area which contains one or more submarine cables. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.70, November 2000, as amended).

S-401 Geo Feature: Cable Area (CBLARE) I

Primitives: Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of cable	(CATCBL)	: power line : transmission line : telephone : telegraph 6 : mooring cable 7 : ferry 8 : fibre optic cable 10 : telecommunications cable	EN	0,*
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		: default name display 2 : alternate name display	(S) EN	0,1 [†]
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
interoperability identifier		MRN (see clause 27.161)	URN	0,1
restriction	(RESTRN)	: anchoring prohibited 2 : anchoring restricted : fishing prohibited : fishing restricted : trawling prohibited 6 : trawling restricted 7 : entry prohibited 8 : entry restricted 9 : dredging prohibited 11 : diving prohibited 12 : diving restricted 13 : no wake : area to be avoided	EN	0,*

		: discharging prohibited : discharging restricted 18 : industrial or mineral exploration/development prohibited : drilling prohibited : cargo transhipment (lightening) prohibited 24 : dragging prohibited : stopping prohibited : speed restricted 38 : use of spuds prohibited 39 : swimming prohibited		
status	(STATUS)	: permanent : periodic/intermittend 7 : temporary 13 : historic 18 : existence doubtful	EN	0,*
<i>vessel speed limit</i>			C	0,*
speed limit			(S) RE	1,1
speed units		2 : kilometres per hour : miles per hour 4 : knots	(S) EN	1,1
vessel class			(S) TE	0,1
scale minimum	(SCAMIN)	[EUR: 22000, US: 60000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
Condition	(CONDTN)	: Under Construction 2 : Ruined : Under Reclamation 5 : Planned Construction	EN	0, 1
Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control : Police : Port : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company	(S) EN	0, 1

		11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		: Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0, *
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		: default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0, *
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0, *
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0, *

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

14.3.1 Submarine cable areas

Cable areas should be encoded where:

- cables (including disused cables) are so numerous in an area that it would be impossible to encode them individually without impairing the legibility of the IENC; or
- a regulatory authority designates an area for the protection of a cable, or cables.

If it is required to encode a submarine cable area, it must be done using the feature **Cable Area**.

Remarks:

- Where populated, the attribute **status** must only be used to encode the status of the area and not the status of the cables in the area.
- For additional guidance regarding the encoding of vessel speed limits, see clause 17.4.
- The outer limits of a cable area must enclose the area in which anchoring and certain forms of fishing are prohibited or inadvisable; that is, the limits must lie a safe distance beyond the actual lines of the outermost cables.
- If it is required to provide the contact details of cable owners/operators (in cases of damage to a cable or for reparation for loss of an anchor in order to avoid such damage), this must be done using an associated instance of the information type **Contact Details** (see clause 24.1).

Distinction: Cable Overhead; Cable Submarine.

Inland specific Encoding Instructions:

- A) Only cables or cable areas where anchoring is prohibited need to be encoded.
- B) **Cable Area** (CBLARE) should generally be used if; $dFCLC/NC < 50$, where $dFCLC$ is distance between first cable and last cable in designated area, and NC is the number of cables; cartographic judgment should still be applied for final analysis.
Cable Areas should be used, unless very precise single cable data is available. Symbology should never be used due to the unreliability of the cable location.
- C) Do not use both **Cable Submarine** and **Cable Area** to represent the same feature.
- D) If various types of cables exist in the area, include description in **file reference** (XTDSC). If at least one of the cables is a powerline, **category of cable** (CATCBL) = 1 has to be used.
- E) US: Extend **Cable Area** (CBLARE) 20 metres beyond first and last cable; farther if uncertainty is greater.
- F) EUR: In case there is an anchoring prohibited notice mark this should be encoded by an anchoring prohibited **Notice Mark** (notmrk) feature (see 20.17).
- G) EUR: In case there is a notice mark indicating the presence of a submarine cable, this may be encoded by an anchoring prohibited **Notice Mark** (notmrk) feature (see 20.17). If such a notice mark is positioned in the waterway it must be encoded.
- H) Use **status** (STATUS) = 18 (existence doubtful) in the case where the existence of the feature cannot be confirmed.
- I) EUR: If the authority has extended the application of the prohibition of anchoring to the use of telescopic piles (spuds), restrn =38 (use of spuds prohibited) must be encoded.
- J) For the cable between a ferry and the fixed point (e.g. anchor, mast) use a **Cable Area** (CBLARE) (not a **Cable Submarine** (CBLSUB) or **Cable Overhead** (cblohd)), as the position of the cable changes during the ride.
- K) **feature name** (OBJNAM) should be used for the name of the owner.

14.4 Pipeline

IHO Definition: **PIPELINE**. A connected set of pipes for conveying liquids, slurries, or gases. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2012).

S-401 Geo Feature: Pipeline Submarine/On Land (PIPSOL) (C)

Primitives: Point, Curve

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol

S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
<i>buried depth</i>	(BURDEP)		RE	0,1
category of pipeline/pipe	(CATPIP)	2 : outfall pipe 3 : intake pipe 4 : sewer 5 : bubbler system 6 : supply pipe 7 : bubble curtain	EN	0,*
condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
<i>depth range minimum value</i>	(DRVAL1)	DRVAL1 <= DRVAL2	RE	0,1
<i>depth range maximum value</i>	(DRVAL2)	DRVAL2 >= DRVAL1	RE	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
<i>fixed date range</i>		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 [†]

date start	(DATSTA)		(S) TD	0,1 [†]
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>multiplicity of features</i>			C	0,1
<i>multiplicity known</i>			(S) BO	1,1
<i>number of features</i>			(S) IN	0,1
product	(PRODCT)	1 : oil 2 : gas 3 : water 7 : chemicals 8 : drinking water 9 : milk 18 : liquefied natural gas 19 : liquefied petroleum gas	EN	0,*
reported date	(SORDAT)	See clause 2.4.8	TD	0,1
<i>restriction</i>	(RESTRN)	1 : anchoring prohibited 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 8 : entry restricted 9 : dredging prohibited 11 : diving prohibited 12 : diving restricted 13 : no wake 14 : area to be avoided 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 20 : drilling prohibited 23 : cargo transhipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 26 : landing prohibited 28 : Overtaking Prohibited 29 : Overtaking of Convoys by Convoys Prohibited 30 : Passing or Overtaking Prohibited 31 : Berthing Prohibited 32 : Berthing Restricted 33 : Making Fast Prohibited 34 : Making Fast Restricted 35 : Turning Prohibited 36 : Restricted Fairway Depth 37 : Restricted Fairway Width 38 : Use of Spuds Prohibited 39 : swimming prohibited 40 : SOx Emission Restricted 41 : NOx Emission Restricted 43 : Passing or Overtaking of Convoys by Convoys Prohibited	EN	0,*
status	(STATUS)	1 : permanent 4 : not in use 7 : temporary	EN	0,*

		12 : illuminated 18 : existence doubtful		
scale minimum	(SCAMIN)	[EUR: 22000, US: 60000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFOM)		(S) TE	0,1 †
<i>pictorial representation</i>	(PICREP)	See clause 2.4.12.2	TE	0,1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

14.4.1 Pipelines, submarine or on land

Submarine pipelines can be divided into two main categories:

- Oil, chemical, gas and water supply pipelines are an important feature of many areas. The pipes are generally encased in concrete for protection and to give them negative buoyancy, which can significantly increase their external diameter. Pipelines are generally laid directly on the seabed, with sections over local dips or hollows being supported physically from beneath. In some cases (for example in shallow water or near the shore), where the external diameter of the pipeline would represent a significant reduction in the water depth above it, the pipelines may be laid in trenches and possibly buried.
- Outfalls and intakes such as sewers, and cooling water intakes, are mainly a feature of inshore waters. For small craft, in particular, such pipes are a potential danger to navigation. The pipes are also vulnerable to damage. They should be encoded on at least the largest optimum display scale IENC datasets.

If it is required to encode a submarine or land pipeline, it must be done using the feature **Pipeline Submarine/On Land**.

Remarks:

- A pipeline that extends vertically from the seabed must be encoded, if required, as an **Obstruction** feature (see clause 13.6). A vertical pipeline on land must be encoded, if required, as a **Landmark** feature (see clause 7.2).
- If the buried depth varies along a submerged pipeline, the pipeline must be encoded as several features.
- The attributes **depth range minimum value** and **depth range maximum value** are used to encode the shallowest and deepest depth over the pipeline.

- Where a bubble curtain pipeline is intended for the retention of oil, this must be encoded as an **Oil Barrier** feature (see clause 16.17), with attribute **category of oil barrier** = 1 (oil retention – high pressure pipe).
- Where a pipeline is disused, it should be encoded with the attribute **status** = 4 (not in use), and the attributes **category of pipeline/pipe** and **product** should not be encoded.
- The term “sub-surface pipeline” is used to describe a pipeline that is “floating” in the water column. If it is required to encode a sub-surface pipeline, this should be done using a **Pipeline Submarine/On Land** feature, with the attribute **depth range minimum value** populated with the minimum design depth over the pipeline. The attribute **depth range maximum value** may be populated with the maximum design depth over the pipeline. A picture file may be referenced using the attribute **pictorial representation** (see clause 2.4.12.2) if it is considered useful, for example a schematic diagram showing the clearances along the pipeline.
- If it is required to provide the contact details of submerged pipeline owners/operators (in cases of damage to a pipeline or for reparation for loss of an anchor in order to avoid such damage), this must be done using an associated instance of the information type **Contact Details** (see clause 24.1).
- Submarine pipes, buried so deep that they are not vulnerable to damage from anchoring, should not be encoded (so that boatmasters are not unnecessarily inhibited from anchoring or fishing). In marginal cases they may be encoded as **Pipeline Submarine/On Land** with the nominal depth to which they are buried encoded using the attribute **buried depth**.
- Buried pipelines on land should not be encoded.

14.4.2 Diffusers, cribs

If it is required to encode diffusers and cribs, this must be done using **Obstruction** features (see clause 13.6), with attribute **category of obstruction** = 3 (diffuser) or 4 (crib).

Distinction: Pipeline Overhead, Submarine Pipeline Area.

Inland specific Encoding Instructions:

- A) **Pipeline Submarine/On Land** features should be collected just inside the shoreline to minimize clutter.
- B) Only pipelines or pipeline areas where anchoring is prohibited need to be encoded.
- C) See **Submarine Pipeline Area** (PIPARE) for multiple pipelines.
- D) EUR: In case there is an anchoring prohibited notice mark this should be encoded by an anchoring prohibited **Notice Mark** (notmrk) feature (see 20.17).
- E) EUR: In case there is a notice mark indicating the presence of a submarine pipeline this may be encoded by an anchoring prohibited **Notice Mark** (notmrk) feature (see 20.17). If such a notice mark is positioned in the waterway it must be encoded.
- F) US: Create **Caution Area** (CTNARE) feature buffering the pipeline 20 metres upstream and downstream of the pipeline with **information text** (INFORM) cable buffer zone.
- G) US: For water intakes, place point **Pipeline Submarine/On Land** (PIPSOL) feature near intake location if actual pipe (line) location is unknown. Place 20 metre diameter **Caution Area** (CTNARE) around **Pipeline Submarine/On Land** (PIPSOL) (P).
- H) Use **status** (STATUS) = 18 (existence doubtful) in the case where the existence of the feature cannot be confirmed.
- I) **feature name** (OBJNAM) should be used for the name of the owner.

14.5 Submarine pipeline area

IHO Definition: SUBMARINE PIPELINE AREA. An area containing one or more submarine pipelines.
(Adapted from S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.118, November 2000).

S-401 Geo Feature: Submarine Pipeline Area (PIPARE) (C)

Primitives: Point, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of pipeline/pipe	(CATPIP)	2 : outfall pipe 3 : intake pipe 4 : sewer 5 : bubbler system 6 : supply pipe	EN	0,*
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
interoperability identifier		MRN (see clause 27.161)	URN	0,1
product	(PRODCT)	1 : oil 2 : gas 3 : water 7 : chemicals 8 : drinking water 18 : liquefied natural gas 19 : liquefied petroleum gas	EN	0,*
restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 7 : entry prohibited 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited	EN	1,*

		12 : diving restricted 13 : no wake 14 : area to be avoided 15 : construction prohibited 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transhipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 26 : landing prohibited 27 : speed restricted 38 : use of spuds prohibited 39 : swimming prohibited		
status	(STATUS)	1 : permanent 4 : not in use 7 : temporary 18 : existence doubtful	EN	0,*
<i>vessel speed limit</i>			C	0,*
speed limit			(S) RE	1,1
speed units		2 : kilometres per hour 3 : miles per hour 4 : knots	(S) EN	1,1
vessel class			(S) TE	0,1
scale minimum	(SCAMIN)	[EUR: 22000, US: 60000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 [†]
Condition	(CONDTN)	1 : Under Construction 2 : Ruined 3 : Under Reclamation 5 : Planned Construction	EN	0, 1
Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port	(S) EN	0, 1

		5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

14.5.1 Submarine pipeline areas

Submarine pipeline areas should be encoded where:

- pipelines (including disused pipelines) are so numerous in an area that it would be impossible to encode them individually without impairing the legibility of the IENC; or
- a regulatory authority designates an area for the protection of a pipeline, or pipelines.

If it is required to encode a submarine pipeline area, it must be done using the feature **Submarine Pipeline Area**.

Remarks:

- Where populated, the attribute **status** must only be used to encode the status of the area and not the status of the pipelines in the area.
- The outer limits of a pipeline area must correspond to the area in which anchoring, trawling and dredging are prohibited or inadvisable; that is, the limits must lie at a safe distance beyond the actual lines of the outermost pipes.
- Where a pipeline area is disused, the **Submarine Pipeline Area** should be encoded with the attribute **status** = 4 (not in use), and the attributes **category of pipeline/pipe** and **product** should not be encoded.
- For additional guidance regarding the encoding of vessel speed limits, see clause 17.4.
- If it is required to provide the contact details of submerged pipeline owners/operators (in cases of damage to a pipeline or for reparation for loss of an anchor in order to avoid such damage), this must be done using an associated instance of the information type **Contact Details** (see clause 24.1).

Distinction: Pipeline Overhead; Pipeline Submarine/On Land.

Inland specific Encoding Instructions:

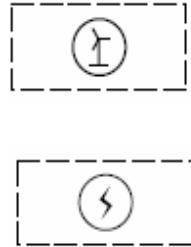
- A) Only pipelines or pipeline areas where anchoring is prohibited need to be encoded.
- B) **Submarine Pipeline Area** (PIPARE) generally should be used if; $dFPLP/NP < 50$, where $dFPLP$ is distance between first pipe and last pipe in designated area, and NP is the number of pipes; cartographic judgment still should be applied for final analysis.
- C) Extend **Submarine Pipeline Area** (PIPARE) 20 metres beyond first and last pipe; farther if uncertainty is greater.
- D) Use multiple values for **category of pipeline/pipe** (CATPIP) if various types are in the **Submarine Pipeline Area** (PIPARE).
- E) EUR: In case there is an anchoring prohibited notice mark this should be encoded by an anchoring prohibited **Notice Mark** (notmrk) feature (see 20.17).
- F) EUR: In case there is a notice mark indicating the presence of a submarine pipeline this may be encoded by an anchoring prohibited **Notice Mark** (notmrk) feature (see 20.17). If such a notice mark is positioned in the waterway it must be encoded.
- G) Use **status** (STATUS) = 18 (existence doubtful) in the case where the existence of the feature cannot be confirmed.
- H) EUR: If the authority has extended the application of the prohibition of anchoring to the use of telescopic piles (spuds), **restriction** (RESTRN) =38 (use of spuds prohibited) must be encoded.
- I) **feature name** (OBJNAM) should be used for the name of the owner.

14.6 Offshore production area

IHO Definition: **OFFSHORE PRODUCTION AREA**. An area at sea within which there are production facilities. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.113, November 2000).

S-401 Geo Feature: Offshore Production Area (OSPAR) (C)

Primitives: Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
	 			
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of offshore production area	(CATPRA)	1 : wind farm 2 : wave farm 3 : current farm 4 : tank farm 5 : seabed material extraction area 6 : solar farm	EN	1,1
condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 4 : wingless 5 : planned construction	EN	0,1
<i>feature name</i>		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
<i>fixed date range</i>		See clause 2.4.8	C	0,1
date end	(DATEEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
height	(HEIGHT)	[xxx.x] metres, e.g., 27.4	RE	0,1
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
product	(PRODCT)	1 : oil 2 : gas 4 : stone 6 : ore 10 : bauxite 14 : sand 23 : electricity	EN	0,*
<i>radar conspicuous</i>	(CONRAD)		BO	0,1

reported date	(SORDAT)	See clause 2.4.8	TD	0,1
restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 7 : entry prohibited 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 14 : area to be avoided 15 : construction prohibited 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transhipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 26 : landing prohibited 27 : speed restricted 39 : swimming prohibited	EN	0,*
status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 7 : temporary 8 : private 12 : illuminated 16 : watched 17 : unwatched 28 : buoyed	EN	0,*
vertical length	(VERLEN)	[xxx.x] (metres), e.g., 0.5	RE	0,1
<i>vessel speed limit</i>			C	0,*
speed limit			(S) RE	1,1
speed units		2 : kilometres per hour 3 : miles per hour 4 : knots	(S) EN	1,1
vessel class			(S) TE	0,1
visual prominence	(CONVIS)	1 : visually conspicuous 2 : not visually conspicuous 3 : prominent	EN	0,1
water level effect	(WATLEV)	2 : always dry 3 : always under water/ submerged 4 : covers and uncovers 7 : floating	EN	0,1

scale minimum	(SCAMIN)	[EUR: 45000, US: 60000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFOM)		(S) TE	0,1 †
Nature of Construction	(NATCON)	2 : Concreted 7 : Metal 8 : Glass Reinforced Plastic	EN	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Date	(SORDAT)		DA	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1

name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

14.6.1 Offshore production areas

Oil and gas fields are exploited in many parts of the world. Although the basic methods for extracting oil and gas are well established, details of the systems and structures may vary with the characteristics of the different fields and are continually being developed. In a typical field, oil or gas is obtained from wells drilled from fixed production platforms, usually standing on the seabed. From each production platform, the oil or gas is carried in pipes to a facilities platform where primary processing, compression and pumping are carried out. The oil or gas is then transported through pipelines to a nearby storage tank, tanker loading buoy or floating terminal, or direct to a tank farm on shore. One facilities platform may collect the oil or gas from several production platforms, and may supply a number of tanker loading buoys or storage units. Such facilities platforms are sometimes termed Field Terminal Platforms. Converted tankers or purpose-built vessels are often permanently moored and used as facilities platforms, floating terminals, and for storage.

Other offshore energy production facilities include wind turbines and underwater current turbines. Other methods of harnessing tidal wave and solar energy are also in use.

If it is required to encode an offshore production area, it must be done using the feature **Offshore Production Area**.

Remarks:

- For additional guidance regarding the encoding of vessel speed limits, see clause 17.4.
- General information about a wind farm such as blade diameter and blade vertical clearance should be encoded, if required, using the complex attribute **information** (see clause 2.4.6). If it is required to encode individual offshore wind turbines, it should be done using a **Wind Turbine** feature (see clause 7.4).
- If it is required to encode individual wave energy devices or underwater turbines within a wave or current farm (or turbine field), it should be done using an **Obstruction** feature (see clause 13.6) or, if there are associated surface structures, using appropriate features, for example **Offshore Platform** or **Special Purpose/General Beacon** (see clauses 14.1 and 20.5). The extent and nature of any restricted area related to the feature should be encoded using a **Restricted Area** feature (see clause 17.8).

- If it is required to encode an offshore development area, it should be done using an **Offshore Production Area** feature, with attributes **category of offshore production area** and **product** populated with the appropriate value; and **condition** = 1 (under construction). A note describing the activities taking place within the area may be included using the complex attribute **information** (see clause 2.4.6). At the conclusion of the development of the area, the attribute **condition** and any associated note can then be removed from the feature.

14.6.2 Offshore tanker loading systems

Although the oil and gas from some fields are sent ashore by submarine pipeline, a variety of mooring systems have been developed for use in deep water and in the vicinity of certain ports, to allow the loading of large vessels and the permanent mooring of floating storage vessels or units. These offshore systems include large mooring buoys, designed for mooring vessels up to 500,000 tonnes, and platforms on structures fixed at their lower ends to the seafloor. They allow a vessel to moor forward or aft to them, and to swing to the wind or stream. Those which are fixed are termed Single Point Moorings (SPM). Those which are a form of mooring buoy are termed Single Buoy Moorings (SBM). Like production platforms, SPM and SBM normally have lights and fog signals.

If it is required to encode an offshore tanker loading system, it must be done using the feature **Installation Buoy** (see clause 20.7).

If it is required to encode an articulated tower, it must be done using an **Offshore Platform** feature (see clause 14.1), with attribute:

category of offshore platform - 4 - articulated loading platform
5 - single anchor leg mooring

8 - floating production, storage and off-loading vessel
10 - navigation, communication and control buoy (which may include storage facilities)

Distinction: Offshore Platform; Wind Turbine.

Inland specific Encoding Instructions:

- A) The vertical distance from the waterlevel to the highest point of the offshore platform should be encoded in **vertical length** (VERLEN).
Vertical length (VERLEN) does not require a datum.
- B) EUR: The encoding of **Offshore Production Areas** is mandatory.

15 Geo Features – Tracks and Routes

15.1 Leading, clearing and transit lines and recommended tracks

If it is required to encode leading, clearing and transit lines and recommended tracks, it must be done using the features **Navigation Line** and **Recommended Track** (see clauses 15.3 and 15.4), and related point navigational aids features (see Section 20). This applies for visual and radio navigational aids.

NB. In North America the word “range” is used instead of “transit” and “leading line”.

15.2 Traffic separation schemes and traffic separation scheme systems

A traffic separation scheme is a routeing measure aimed at the separation of opposing streams of traffic by appropriate means and by the establishment of traffic lanes (IMO Ships' Routeing). A traffic separation scheme separates opposing streams of marine traffic by the establishment of separation zones or lines and traffic lanes. It may include inshore traffic zones. A separation zone or line separates:

- 1) The traffic lanes in which ships are proceeding in opposite or nearly opposite directions,
- 2) A traffic lane from the adjacent sea area, or
- 3) Traffic lanes designated for particular classes of ships proceeding in the same direction.

If it is required to encode a traffic separation scheme, it must be done using:

- **Inshore Traffic Zone** (see clause 15.11);
- **Precautionary Area** (see clause 15.12);
- **Separation Zone or Line, Traffic Separation Scheme Boundary, Traffic Separation Scheme Crossing and Traffic Separation Scheme** (see clauses 15.14 to 15.17); and
- Navigational aids features (see Sections 18 to 21).

For guidance on provision of advance notification of changes to traffic separation schemes, see clause 31.1.1.

To encode a traffic separation scheme (TSS) system, the **Inshore Traffic Zone**, **Precautionary Area**, **Separation Zone or Line**, **Traffic Separation Scheme Boundary**, **Traffic Separation Scheme Crossing**, features must be associated with the **Traffic Separation Scheme Aggregation** (see clause 15.17) using the association **Traffic Separation Scheme Aggregation** (see clause 25.14). The **Traffic Separation Scheme** may additionally be associated to the aids to navigation marking the components of the Scheme (if they are stated in the regulation defining the TSS) using the association **Aids to Navigation Association** (see clause 25.2). Where it is required to indicate the name of the complete TSS, this must be done using the attribute feature name for the **Traffic Separation Scheme**. Where it is required to populate textual information for the TSS, this should be done using the complex attribute **information** (see clause 2.4.6) for the **Traffic Separation Scheme**.

Remarks:

- Traffic separation scheme systems may be included with other routeing measures such as two-way routes, or another traffic separation scheme system, to comprise a complete traffic routeing system. To encode the relationship between routeing measures, the named association defining each routeing measure within the system (or the relevant feature if the routeing measure consists of a single feature) may be associated using a **Traffic Separation Scheme Aggregation** to form a hierarchical relationship (see clause 25.14). The individual elements comprising different routeing measures must not be aggregated into a single named association.

- All features comprising a TSS or TSS system must have the same value populated for the attribute **scale minimum** (see clause 2.5.9).

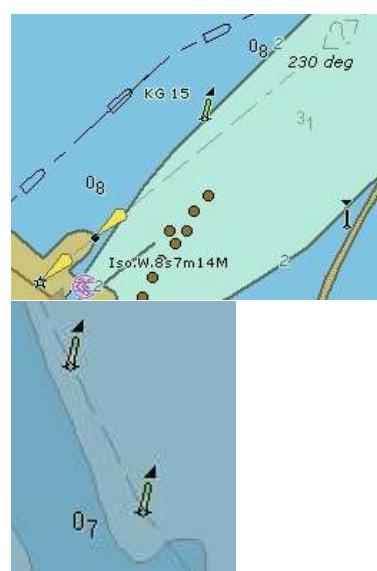
15.3 Navigation line

IHO Definition: **NAVIGATION LINE.** A straight line extending towards an area of navigational interest and generally generated by two navigational aids or one navigational aid and a bearing. (Service Hydrographique et Oceanographique de la Marine, France).

For IENCs a navigation line either defines a recommended track or marks the boundary between a safe and a dangerous area.

S-401 Geo Feature: Navigation Line (NAVLNE) (O)

Primitives: Curve

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol
		

S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of navigation line	(CATNAV)	1 : clearing line 2 : transit line 3 : leading line bearing a recommended track	EN	1,1
<i>fixed date range</i>		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>measured distance</i>			IN	0,1
orientation			C	1,1
orientation uncertainty			(S) RE	0,1
orientation value	(ORIENT)	[xxx.xx or "unknown"] (degree (°)), e.g., 110.76	(S) RE	1,1
<i>periodic date range</i>		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1

<i>status</i>	(STATUS)	1 : permanent 2 : occasional 5 : periodic/intermittent 7 : temporary 8 : private 14 : public	EN	0,*
scale minimum	(SCAMIN)	[EUR: 22000, US: 45000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NIINFOM)		(S) TE	0,1 †
Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1

.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

† For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

15.3.1 Navigation lines

Clearing Lines are important in rocky areas where dangers are not guarded by buoys and where sailing vessels (which are not always able to keep to a direct track) and other small craft may navigate close inshore. Transits marking isolated dangers are based on beacons or other marks which are erected on shore to indicate (approximately, unless there are two pairs of beacons) the position of an isolated danger. Leading lines based on beacons or lights must be encoded where the optimum display scale for the IENC data permits. Leading lines based on natural features should be encoded on the largest optimum display scale IENC data where they appear to be useful, particularly if other navigational aids seem inadequate.

If it is required to encode a navigation line, it must be done using the feature **Navigation Line**.

The use of **Navigation Line** and **Recommended Track** (see clause 15.4) is defined in more detail in the following Table, and in Figure 15-4 below:

Figure		Navigation Line	Recommended Track	Navigational Aids
1	Recommended track on a leading line	category of navigation line = 3	based on fixed marks = True	at least 2
2	Clearing line on marks in line	category of navigation line = 1	none	at least 2
3	Transit line on marks in line	category of navigation line = 2	none	at least 2

4	Recommended track on a bearing	category of navigation line = 3	based on fixed marks = True	1
5	Clearing line on a bearing	category of navigation line = 1	none	1
6	Transit line on a bearing	category of navigation line = 2	none	1
7	Recommended track not based on fixed marks	none	based on fixed marks = False	none

Table 15-1 – Navigation lines – Attribute encoding

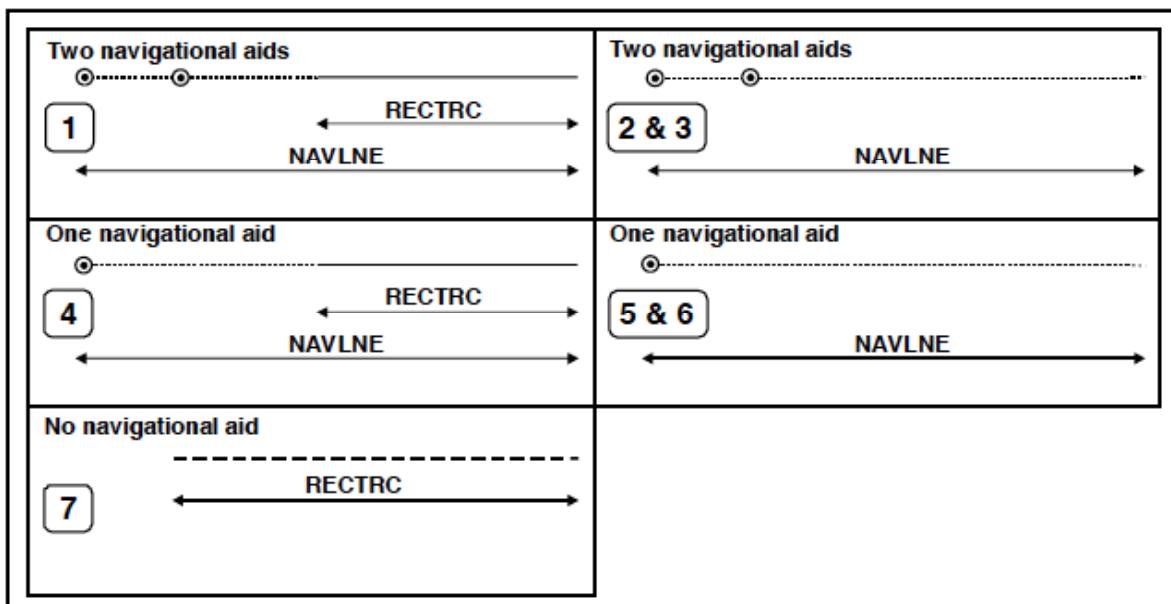


Figure 15-4 – Navigation lines – Geometry encoding

Remarks:

- The value populated for the mandatory attribute **orientation value** must be the value of the bearing from seaward.
- The extent of the navigation line depends on the visibility of the navigational aids.
- The recommended track is that portion of a navigation line that a ship should use for navigation.

15.3.2 Measured distances

If the track to be followed is on a leading line or a bearing, it must be encoded in the way described in the Table and Figure 15-4 above (cases 1 or 4). If the track is not on a leading line or bearing, it must be encoded only as a **Navigation Line** feature with the attribute **category of navigation line** being set to an empty (null) value. In either case, if it is required to encode the measured distance, it must be done using the attribute **measured distance**.

If it is required to encode the transit lines, they must be done using **Navigation Line** features, with **category of navigation line** = 2 (transit line).

If it is required to encode the beacons, they must be done using **Special Purpose/General Beacon** features, with attribute **category of special purpose mark** = 17 (measured distance mark).

On occasions, one or more of the transits used for the measured distance may incorporate an existing landmark as the front or rear mark. In this case, if **Landmark** is encoded, **category of special purpose mark = 17** must also be populated.

Remarks:

- All features comprising a measured distance must have the same value populated for the attribute **scale minimum** (see clause 2.5.9).

Distinction: Recommended Route Centreline; Recommended Track.

Inland specific Encoding Instructions:

- A) A **Navigation Line** is usually defined by two (leading) lights or beacons or a directional light.

15.4 Recommended track

IHO Definition: **RECOMMENDED TRACK**. A route which has been specially examined to ensure so far as possible that it is free of dangers and along which ships are advised to navigate. (IMO Ships' Routeing).

For IENCs it is a recommended sailing route for all or certain vessels.

S-401 Geo Feature: Recommended Track (RECTRC) (C)

Primitives: Curve

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>
		

S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
based on fixed marks	(CATTRK)		BO	1,1
<i>depth range minimum value</i>	(DRVAL1)		RE	0,1
<i>feature name</i>		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
<i>fixed date range</i>		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>maximum permitted draught</i>	(INFORM) (NINFORM)		RE	0,1
orientation value	(ORIENT)	[xxx.xx or "unknown"] (degree (°)), e.g., 110.76	RE	1,1
<i>periodic date range</i>		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1

<i>quality of vertical measurement</i>	(QUASOU)	1 : depth known 2 : depth or least depth unknown 6 : least depth known	EN	0,*
<i>status</i>	(STATUS)	1 : permanent 2 : occasional 5 : periodic/intermittent 6 : reserved 8 : private 9 : mandatory 14 : public	EN	0,*
<i>technique of vertical measurement</i>	(TECSOU)	1 : found by echo sounder 2 : found by side scan sonar 3 : found by multi beam 6 : swept by wire drag 8 : swept by vertical acoustic system 9 : found by electromagnetic sensor 13 : swept by side scan sonar 15 : found by LIDAR 16 : synthetic aperture radar 17 : hyperspectral imagery 18 : mechanically swept	EN	0,*
<i>traffic flow</i>	(TRAFIC)	1 : inbound 2 : outbound 3 : one-way 4 : two-way	EN	1,1
<i>vertical uncertainty</i>	(SOUACC)		C	0,1
uncertainty fixed			(S) RE	1,1
uncertainty variable factor			(S) RE	0,1
<i>scale minimum</i>	(SCAMIN)	[45000] or see clause 2.5.9	IN	1,1
<i>information</i>	(INFORM)	See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 [†]
Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military	(S) EN	0, 1

		10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

† Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

15.4.1 Recommended tracks

Recommended tracks usually comprise a number of sections (sometimes termed “legs”) which lead between dangers lying close on both sides of the track or fairway. Tracks commonly include some

sections which are leading lines (see clause 15.1). The distinction between tracks and fairways, in this context, is that tracks have no specified outer limits and fairways do have specified outer limits.

It is important to recognise that it is not the role of cartographers to create “recommended” tracks and other

“recommended” routeing measures; such recommendations are made by other authorities. The word “Recommended”, used in connection with recommended tracks and other recommended routeing measures usually implies that it has been recommended by a competent authorit. Occasionally, the recommendation may be based on advice directly from a competent surveyor or established by precedent.

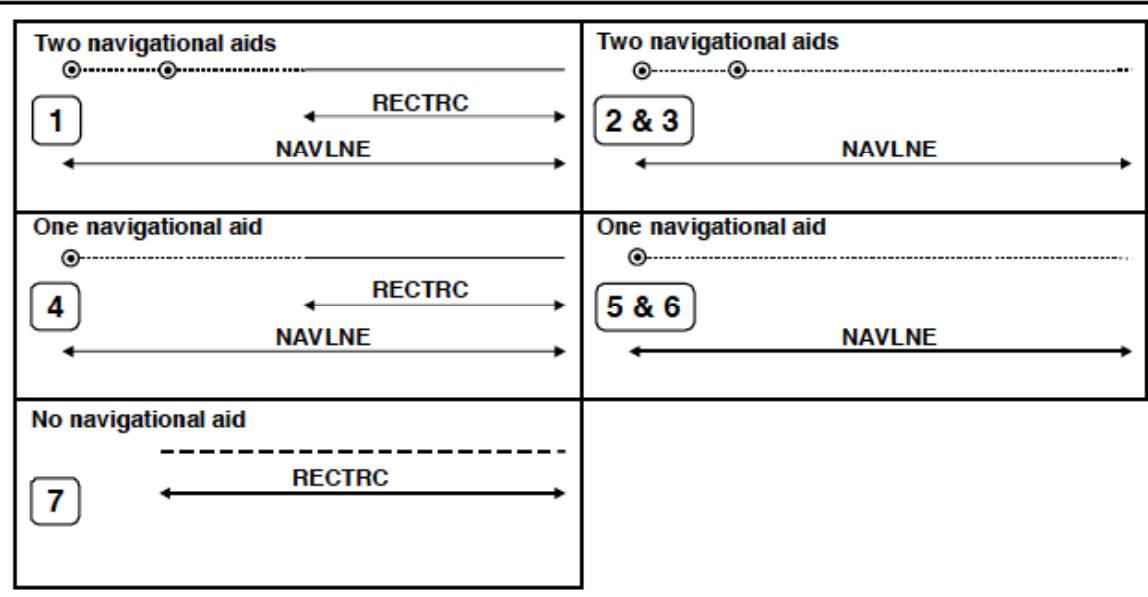
Recommended tracks include all channels recommended for hydrographic reasons to lead safely between shoal depths. The use of such tracks is generally left to the discretion of the boatmaster and will depend on the vessel’s draught, the state of the tide, adequacy of navigational aids and so on.

If it is required to encode a recommended track, it must be done using the feature **Recommended Track**.

The use of **Navigation Line** and **Recommended Track** is defined in more detail in the following Table, and in Figure 15-5 below.

Figure		Navigation Line	Recommended Track	Navigational Aids
1	Recommended track on a leading line	category of navigation line = 3	based on fixed marks = True	at least 2
2	Clearing line on marks in line	category of navigation line = 1	none	at least 2
3	Transit line on marks in line	category of navigation line = 2	none	at least 2
4	Recommended track on a bearing	category of navigation line = 3	based on fixed marks = True	1
5	Clearing line on a bearing	category of navigation line = 1	none	1
6	Transit line on a bearing	category of navigation line = 2	none	1
7	Recommended track not based on fixed marks	none	based on fixed marks = False	none

Table 15-5 – Navigation lines – Attribute encoding

*Figure 15-5 – Navigation lines – Geometry encoding*Remarks:

- The attribute **depth range minimum value** is used to encode the shallowest depth along the track, where required.
- The attribute **maximum permitted draught** is used to encode the maximum draught permitted on the track, where required.
- The recommended track is that portion of a navigation line (see clause 15.3) that a ship should use for navigation (see Figure 15-5 above).
- In the case of a two-way recommended track, only one value of orientation is encoded (in the mandatory attribute **orientation value**); the other value can be deduced (that is, the value in **orientation value** + 180 degrees). The value of orientation encoded on **orientation value** should be the value of the bearing from seaward. If it is not possible to define a seaward direction, the value that is less than 180° should be used.
- When the traffic flow along a recommended track is one way (attribute **traffic flow** = 1, 2 or 3), the resultant direction of the line (accounting for the direction of digitising and any subsequent reversal of the line) associated with the **Recommended Track** must be the same as the direction of the traffic flow, in order to ensure the correct representation in the Inland ECDIS or ECS of the direction to be followed.

Distinction: Fairway; Navigation Line; Recommended Route Centreline; Recommended Traffic Lane Part.

Inland specific Encoding Instructions:

- Line should follow known safe and optimal route used by commercial vessels. If no such route is known, the deepest area within the channel, current patterns, and any obstructions to navigation should be considered.
- The **Recommended Track** is that portion of a **Navigation Line** that a ship should use for navigation.
- US: CATTRK always = 2 (not based on a system of fixed marks)
ORIENT always = "unknown"
- US: A second **Recommended Track** should be used only if needed for routing through an alternate lock, or around a lock, if warranted. Primary and secondary **Recommended Track**

must be distinguished with **information** (INFORM) attribute, and use of **Sea Area** (SEAARE) feature for labelling.

- E) EUR: If a recommended track exists, it must be encoded.

15.5 Fairway

IHO Definition: **FAIRWAY.** That part of a river, harbour and so on, where the main navigable channel for vessels of larger size lies. It is also the usual course followed by vessels entering or leaving harbours, called “ship channel”. (International Maritime Dictionary, 2nd Edition).

For IENCs the part of the navigable waterway area where a certain water depth within a certain width is available for the continuous navigation.

S-401 Geo Feature: Fairway (FAIRWY) (C)

Primitives: Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
<i>depth range minimum value</i>	(DRVAL1)		RE	0,1
<i>feature name</i>		See clause 2.5.8	C	0,*
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 †
<i>fixed date range</i>		See clause 2.4.8	C	0,1
<i>date end</i>	(DATEND)		(S) TD	0,1 †
<i>date start</i>	(DATSTA)		(S) TD	0,1 †
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>maximum permitted draught</i>			RE	0,1
<i>orientation value</i>	(ORIENT)		RE	0,1
<i>quality of vertical measurement</i>	(QUASOU)	1 : depth known 2 : depth or least depth unknown 6 : least depth known	EN	0,*

<i>restriction</i>	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 15 : construction prohibited 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transhipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 27 : speed restricted 28 : Overtaking Prohibited 29 : Overtaking of Convoys by Convoys Prohibited 30 : Passing or Overtaking Prohibited 31 : Berthing Prohibited 32 : Berthing Restricted 33 : Making Fast Prohibited 34 : Making Fast Restricted 35 : Turning Prohibited 36 : Restricted Fairway Depth 37 : Restricted Fairway Width 38 : Use of Spuds Prohibited 39 : swimming prohibited 40 : SOx Emission Restricted 41 : NOx Emission Restricted 43 : Passing or Overtaking of Convoys by Convoys Prohibited	EN	0,*
<i>status</i>	(STATUS)	1 : permanent 3 : recommended 6 : reserved 7 : temporary 9 : mandatory 28 : buoyed	EN	0,*

<i>traffic flow</i>	(TRAFIC)	1 : inbound 2 : outbound 3 : one-way 4 : two-way	EN	0,1
<i>vertical uncertainty</i>	(SOUACC)		C	0,1
uncertainty fixed			(S) RE	1,1
uncertainty variable factor			(S) RE	0,1
<i>vessel speed limit</i>			C	0,*
speed limit			(S) RE	1,1
speed units		2 : kilometres per hour 3 : miles per hour 4 : knots	(S) EN	1,1
vessel class			(S) TE	0,1
scale minimum	(SCAMIN)	[90000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFOM)		(S) TE	0,1 †
Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports	(S) EN	0, 1

		10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data		
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Component	Fairway Aggregation (see clause 25.5)	Fairway System	Association	0,*
The Primary Feature	Fairway Auxiliary (see clause 25.6)	Cardinal Beacon, Cardinal Buoy, Caution Area, Daymark, Dredged Area, Isolated Danger Beacon, Isolated Danger Buoy, Lateral Beacon, Lateral Buoy, Landmark, Notice Mark, Pile, Recommended Route Centreline, Recommended Track, Restricted Area, Safe Water Beacon, Safe Water Buoy, Special Purpose/General Beacon, Special Purpose/General Buoy	Aggregation	0,1
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

† Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

15.5.1 Fairways

A fairway, sometimes called Ship Channel, is the main navigable channel in the approaches to, or within, a river or harbour. Fairways which are designated by a regulatory authority are treated as Routeing Measures.

If it is required to encode a fairway, it must be done using the feature **Fairway**.

Remarks:

- The attribute **depth range minimum value** is used to encode the shallowest depth in the fairway, where known.
- The attribute **maximum permitted draught** is permitted on **Fairway** only where the **Fairway** defines the entire system (that is, the **Fairway** has not been associated with other **Fairway** features and the feature **Fairway System** (see clause 15.6) to define a complete fairway system).
- For additional guidance regarding the encoding of vessel speed limits, see clause 17.4.
- Where beacons or buoys marking a fairway are offset from the actual fairway limits, this should be indicated using the complex attribute **information** (see clause 2.4.6).
- To encode a complete fairway system, the **Fairway** features may be associated with the feature **Fairway System** using the association **Fairway Aggregation** (see clause 25.5). The navigational aids features defining a fairway section may be associated with the **Fairway** using the association **Fairway Auxiliary** (see clause 25.6). Where it is required to indicate the name of a complete fairway system, this should be done using the complex attribute **feature name** for the **Fairway System** feature; or on a single **Fairway** feature where this feature defines the entire system. Where it is required to encode textual information for the fairway system, this should be done using the complex attribute **information**.

Distinction: Traffic Separation Scheme Lane Part.

Inland specific Encoding Instructions:

- A) The fairway has to be encoded if there is one.
- B) A publication is only allowed if the competent authority has verified its location.
- C) The **Fairway** must be covered by **Depth Areas**.
- D) **Depth range minimum value** (DRVAL1) of the **Fairway** (FAIRWY) should be used to provide the guaranteed depth of the water within the fairway. **Depth Areas** shall be used to provide actual depth values in addition to **Fairway** (FAIRWY) (refer to 11.6)
- E) If no detailed bathymetry is available, the **Fairway** shares the geometry of a **Depth Area** with **depth range minimum value** (DRVAL1) = official water depth in metres issued by the competent authority and **depth range maximum value** (DRVAL2) = "unknown"; please refer to 11.6.
- F) If no detailed bathymetry is available, on each side of the **Fairway** there must be a **Depth Area** between the shoreline and the boundary of the **Fairway** with **depth range minimum value** (DRVAL1) = 0 or "unknown" and **depth range maximum value** (DRVAL2) = official water depth in metres issued by the competent authority; please refer to 11.6)
- G) If there is a fairway separation with a one-way regulation a two-way route part (refer to 15.8) has to be encoded..

15.6 Fairway system

IHO Definition: **FAIRWAY SYSTEM.** That part of a river, harbour and so on, where the main navigable channel for vessels of larger size lies. It is also the usual course followed by vessels entering or leaving harbours, called “ship channel”. (International Maritime Dictionary, 2nd Edition).

A fairway system is an aggregation of connected fairway features making up a complex fairway system.

S-401 Geo Feature: Fairway System (C_AGGR) (O)

Primitives: Surface, No Geometry

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol	Type	Multiplicity
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
interoperability identifier		MRN (see clause 27.161)	URN	0,1
maximum permitted draught			RE	0,1
periodic date range		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
scale minimum	(SCAMIN)	[90000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFOM)		(S) TE	0,1 [†]
Reported Date	(SORDAT)		TD	0,1
Pictorial Representation	(PICREP)		TE	0,1
Source Indication			C	0,1

<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 2 : Police 3 : Port 4 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 16 : Customs 5 : Maritime	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		6 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0, *
<i>language</i>		ISO 639-2/T	(S) TE	1, 1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1, 1
<i>name usage</i>		7 : default name display 2 : alternate name display	(S) EN	0, 1 [†]
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Collection	Fairway Aggregation (see clause 25.5)	Fairway	Aggregation	0, 1

The Collection	Aids to Navigation Association (see clause 25.2)	Building, Bridge, Cardinal Beacon, Cardinal Buoy, Conveyor, Crane, Daymark, Dolphin, Emergency Wreck Marking Buoy, Fishing Facility, Floating Dock, Fortified Structure, Hulk, Isolated Danger Beacon, Isolated Danger Buoy, Landmark, Lateral Beacon, Lateral Buoy, Mooring Buoy, Offshore Platform, Pile, Pipeline Overhead, Pontoon, Pylon/Bridge Support, Safe Water Beacon, Safe Water Buoy, Shoreline Construction, Silo/Tank, Span Fixed, Span Opening, Special Purpose/General Beacon, Special Purpose/General Buoy, Structure Over Navigable Water, Wind Turbine	Aggregation	0,1
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

15.6.1 Fairway systems

A fairway, sometimes called Ship Channel, is the main navigable channel in the approaches to, or within, a river or harbour. Fairways which are designated by a regulatory authority are treated as Routeing Measures.

A fairway system is composed of two or more **Fairway** features that comprise a complex fairway routeing system, for instance a long fairway comprising several bends. To define the complete fairway system, the **Fairway** features must be aggregated in a **Fairway System** feature, using the association **Fairway Aggregation** (see clause 25.5).

Remarks:

- The name of the complete fairway system must be populated using the complex attribute **feature name**. Where it is required for the name to be displayed in the Inland ECDIS or ECS, the **Fairway System** must be encoded using surface geometry. The extent of the geometry of the **Fairway System** should utilise the geometry of the components of the system so as to cover its full extent.

- All features comprising a fairway system must have the same value populated for the attribute **scale minimum** (see clause 2.5.9).
- Where it is required to populate textual information for the fairway system, this should be done using the complex attribute **information** (see clause 2.4.6), or if the information is considered essential for safe navigation, using a **Caution Area** feature (see clause 16.11).

Distinction: Traffic Separation Scheme; Two-Way Route.

Inland specific Encoding Instructions:

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15.7 Recommended route centreline

IHO Definition: **RECOMMENDED ROUTE CENTRELINE.** The recommended route centreline indicates the “centreline” of a recommended route. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.137, November 2000).

S-401 Geo Feature: Recommended Route Centreline (RCRTCL) (O)

Primitives: Curve

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol	Type	Multiplicity
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
based on fixed marks	(CATTRK)		BO	1,1
depth range minimum value	(DRVAL1)		RE	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
interoperability identifier		MRN (see clause 27.161)	URN	0,1
orientation value	(ORIENT)		RE	0,1
periodic date range		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
quality of vertical measurement	(QUASOU)	1 : depth known 2 : depth or least depth unknown 3 : doubtful sounding 4 : unreliable sounding 6 : least depth known	EN	0,*
status	(STATUS)	1 : permanent 5 : periodic/intermittent 6 : reserved 9 : mandatory	EN	0,*

technique of vertical measurement	(TECSOU)	1 : found by echo sounder 3 : found by multi beam 6 : swept by wire drag 8 : swept by vertical acoustic system 9 : found by electromagnetic sensor 13 : swept by side scan sonar 15 : found by LIDAR 16 : synthetic aperture radar 17 : hyperspectral imagery 18 : mechanically swept	EN	0,*
traffic flow	(TRAFIC)	1 : inbound 2 : outbound 3 : one-way 4 : two-way	EN	0,1
vertical uncertainty	(SOUACC)		C	0,1
uncertainty fixed			(S) RE	1,1
uncertainty variable factor			(S) RE	0,1
scale minimum	(SCAMIN)	[EUR: 22000, US: 30000] or see clause 2.5.9	IN	1,1
information	(INFORM)	See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 [†]
Reported Date	(SORDAT)		TD	0, 1
Pictorial Representation	(PICREP)		TE	0, 1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication	(S) EN	0, 1

		7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data		
.....Source	(SORIND)		(S) TE	1,*
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Auxiliary Feature	Fairway Auxiliary (see clause 25.6)	Fairway	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

† Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

15.7.1 Recommended routes

A recommended route is a route of undefined width, for the convenience of ships in transit, which is often marked by centreline buoys. (IMO Ships Routeing, 2010). IMO-designated recommended routes are listed in IMO publication “*Ships’ Routeing*” Part E. This type of routeing measure was adopted to include such features as the “transit routes” (through former minefields) in the entrances to the Baltic Sea. In contrast to recommended tracks (see clause 15.4), there is usually ample sea-room for vessels to keep well starboard (to the right) of the centreline.

If it is required to encode the centreline of a recommended route, it must be done using the feature **Recommended Route Centreline**.

Remarks:

- The attribute **depth range minimum value** is used to encode the shallowest depth on the route, where known.
- In the case of a recommended route centreline, only one value of orientation is encoded (in the attribute **orientation value**); the other value can be deduced (that is, the value in **orientation value** + 180 degrees). The value of orientation encoded on **orientation value** should be the value of the bearing from seaward. If it is not possible to define a seaward direction, the value that is less than 180° should be used.
- When the traffic flow is one way (attribute **traffic flow** = 1, 2 or 3), the resultant direction of the line (accounting for the direction of digitising and any subsequent reversal of the line) associated with the **Recommended Route Centreline** must be the same as the direction of traffic flow, in order to ensure the correct representation in the Inland ECDIS or ECS of the direction to be followed.

Distinction: Recommended Track; Recommended Traffic Lane Part.

Inland specific Encoding Instructions:

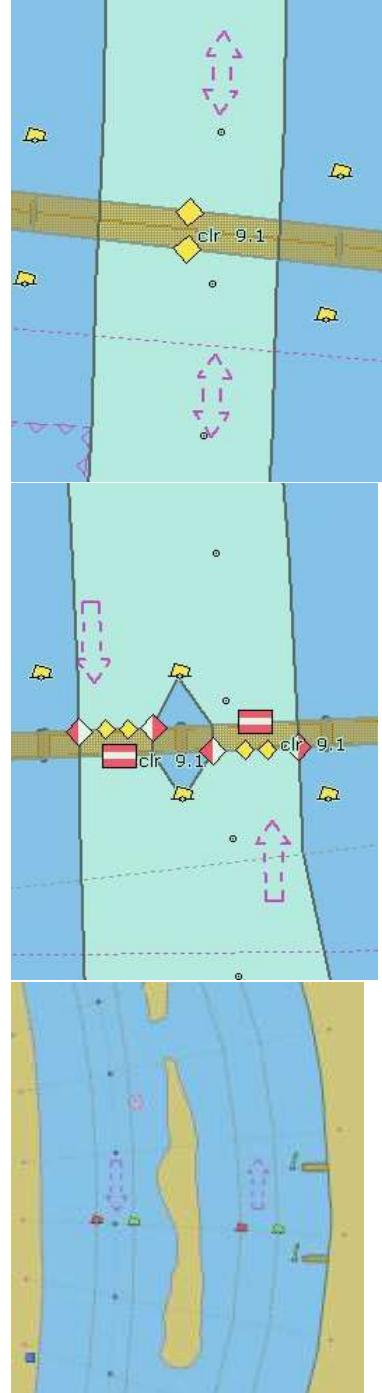
15.8 Two-way route part

IHO Definition: **TWO-WAY ROUTE PART.** An area of a two-way route within which traffic flow is generally along one bearing (and possibly its reciprocal). (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.193, November 2000).

For IENCs a two-way route part is either for the entire area, or a part of an area where the traffic flow is restricted to one-way.

S-401 Geo Feature: Two-Way Route Part (TWRTPT) (O)

Primitives: Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>
		

S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
<i>based on fixed marks</i>	(CATTRK)		BO	0,1
<i>depth range minimum value</i>	(DRVAL1)		RE	0,1
<i>fixed date range</i>		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
orientation value	(ORIENT)	[xxx.xx or "unknown"] (degree (°)), e.g., 110.76	RE	1,1
<i>quality of vertical measurement</i>	(QUASOU)	1 : depth known 2 : depth or least depth unknown 3 : doubtful sounding 4 : unreliable sounding 6 : least depth known	EN	0,*
<i>status</i>	(STATUS)	1 : permanent 3 : recommended 6 : reserved 9 : mandatory	EN	0,*
<i>technique of vertical measurement</i>	(TECSOU)	1 : found by echo sounder 2 : found by side scan sonar 3 : found by multi beam 5 : found by lead line 6 : swept by wire drag 8 : swept by vertical acoustic system 9 : found by electromagnetic sensor 10 : photogrammetry 11 : satellite imagery 12 : found by levelling 13 : swept by side scan sonar 15 : found by LIDAR 16 : synthetic aperture radar 17 : hyperspectral imagery 18 : mechanically swept	EN	0,*
traffic flow	(TRAFIC)	1 : inbound 2 : outbound 3 : one-way 4 : two-way	EN	1,1
<i>vertical uncertainty</i>			C	0,1
uncertainty fixed	(SOUACC)		(S) RE	1,1
uncertainty variable factor			(S) RE	0,1
scale minimum	(SCAMIN)	[EUR: 12000, US: 18750] or see clause 2.5.9	IN	1,1
<i>information</i>	(INFORM)	See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]

headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
Reported Date	(SORDAT)		TD	0, 1
Pictorial Representation	(PICREP)		TE	0, 1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity

The Component	Bridge Aggregation (see clause 25.3)	Bridge	Association	0,*
The Component	Barrage Association (see clause 0)	Dam	Association	0,*
The Component	Lock Aggregation (see clause 25.23)	Lock Basin	Association	0,*
The Component	Tunnel Aggregation (see clause 25.27)	Tunnel	Association	0,*
The Component	Two-Way Route Aggregation (see clause 25.15)	Two-Way Route	Association	0,*
The Component	Traffic Separation Scheme Aggregation (see clause 25.14)	Traffic Separation Scheme	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

15.8.1 Two-way Routes

A two way route is a route within defined limits inside which two way traffic is established, aimed at providing safe passage of ships through waters where navigation is difficult or dangerous (IMO Ships Routeing, 2010). It consists of one or more areas within which traffic flows in two directions along one bearing and/or its reciprocal. Such routes are established by regulatory authorities and may be adopted by IMO. IMO-designated two-way routes are listed in IMO publication “*Ships’ Routeing*” Part E. When it is required to encode these areas, this must be done using the feature **Two-Way Route Part**. These route parts will generally be two-way, but some may be restricted to one-way traffic flow.

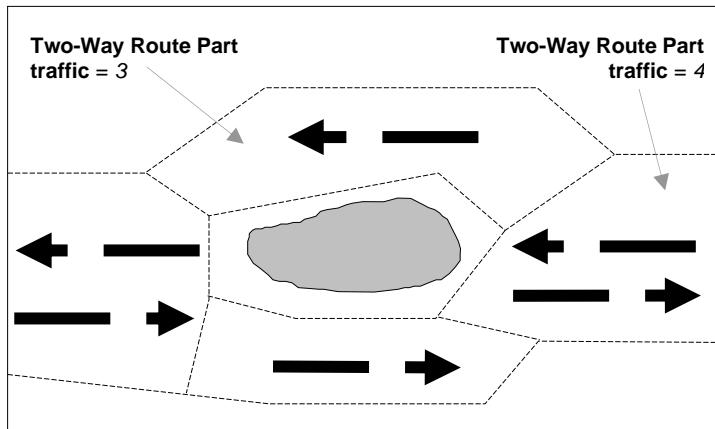


Figure 15-6 – One-way traffic flow in a two-way route

If it is required to encode a two-way route with one-way sections, separate **Two-Way Route Part** features must be encoded for the different parts, with attribute **traffic flow** = 3 (one-way) or 4 (two-way). In one-way sections, the mandatory attribute **orientation value** must indicate the true direction of traffic flow, not its reciprocal. In two-way sections, **orientation value** may indicate either direction of traffic flow.

Remarks:

- The orientation of the two-way route part is defined by the centreline of the part and is related to the general direction of the two-way route.
- The attribute **depth range minimum value** is used to encode the shallowest depth on the part, where required.
- To encode a complete Two-way route, the **Two-Way Route Part** features must be associated with the feature **Two-Way Route** (see clause 15.9) using the association **Two-Way Route Aggregation** (see clause 25.15). Where it is required to indicate the name of a complete two-way route, this should be done using the complex attribute **feature name** for the **Two-Way Route** feature. Where it is required to encode textual information for the complete two-way route, this should be done using the complex attribute **information** (see clause 2.4.6) for the **Two-Way Route** feature.
- All **Two-Way Route Part** features comprising a complete two-way route must have the same value populated for the attribute **scale minimum** (see clause 2.5.9).
- Two-way routes may be included with other routeing measures such as traffic separation schemes to comprise a complete traffic routeing system. To encode the relationship between routeing measures, the feature defining each routeing measure within the system (or the relevant feature if the routeing measure consists of a single feature) may be associated with the feature **Traffic Separation Scheme** (see clause 15.17) using the **Traffic Separation Scheme Aggregation** (see clause 25.14) to form a hierarchical relationship. The individual elements comprising different routeing measures must not be collected into a single **Traffic Separation Scheme** feature.

Distinction: Recommended Traffic Lane Part; Traffic Separation Scheme Lane Part.

Inland specific Encoding Instructions:

- A) The **Two-Way Route Parts** in front and behind of a bridge must be at least 200 m long.
- B) To avoid the symbolization of the boundary of a two-way route part at the borderline between two cells, the edge may be masked.

15.9 Two-way route

IHO Definition: **TWO-WAY ROUTE.** A route within defined limits inside which two way traffic is established, aimed at providing safe passage of ships through waters where navigation is difficult or dangerous. (IMO Ships' Routeing).

S-401 Geo Feature: Two-Way Route (O)

Primitives: Surface, No Geometry

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
<i>fixed date range</i>		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
maximum permitted draught			RE	0,1
scale minimum	(SCAMIN)	(EUR: 12000, US: 18750) or see clause 2.5.9	IN	1,1
information	(INFORM)	See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 [†]
Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police	(S) EN	0, 1

		4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Collection	Two-Way Route Aggregation (see clause 25.15)	Two-Way Route Part	Aggregation	0,1
The Component	Traffic Separation Scheme Aggregation (see clause 25.14)	Traffic Separation Scheme	Association	0,*

The Collection	Aids to Navigation Association (see clause 25.2)	Building, Bridge, Cardinal Beacon, Cardinal Buoy, Conveyor, Crane, Daymark, Dolphin, Emergency Wreck Marking Buoy, Fishing Facility, Floating Dock, Fortified Structure, Hulk, Isolated Danger Beacon, Isolated Danger Buoy, Landmark, Lateral Beacon, Lateral Buoy, Mooring Buoy, Offshore Platform, Pile, Pipeline Overhead, Pontoon, Pylon/Bridge Support, Safe Water Beacon, Safe Water Buoy, Shoreline Construction, Silo/Tank, Span Fixed, Span Opening, Special Purpose/General Beacon, Special Purpose/General Buoy, Structure Over Navigable Water, Wind Turbine	Sggregation	0,1
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*
† Complex attribute feature name , sub-attribute name usage is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.				
For each instance of fixed date range , at least one of the sub-attributes date end or date start must be populated.				
For each instance of information , at least one of the sub-attributes file reference or text must be populated.				
15.9.1 Two-way routes To define the complete two-way system, the Two-Way Route Part features must be aggregated with a TwoWay Route feature using the association Two-Way Route Aggregation .				
<u>Remarks:</u>				
<ul style="list-style-type: none"> The name of the two-way route, where required, must be populated using the complex attribute feature name. Where it is required for the name to be displayed in the Inland ECDIS or ECS, the Two-Way Route must be encoded using surface geometry. The extent of the geometry of the Two-Way Route should utilise the geometry of the components of the route so as to cover its full extent. All features comprising a two-way route must have the same value populated for the attribute scale minimum (see clause 2.5.9). Where it is required to populate textual information for the two-way route, this should be done using the complex attribute information (see clause 2.4.6) for the Two-Way Route; or if the information is considered essential for safe navigation, using a Caution Area feature (see clause 16.11). 				
Distinction: Fairway System; Traffic Separation Scheme; Two-Way Route Part.				

Inland specific Encoding Instructions:

15.10 Recommended traffic lane part

<p>IHO Definition: RECOMMENDED TRAFFIC LANE PART. A traffic flow pattern indicating a recommended directional movement of traffic where it is impractical or unnecessary to adopt an established direction of traffic flow. (IMO Ships' Routeing).</p>				
<p>S-401 Geo Feature: Recommended Traffic Lane Part (RCTLPT) (O)</p>				
<p>Primitives: Point, Surface</p>				
<i>Real World</i>	<i>Paper Chart Symbol</i>		<i>Inland ECDIS or ECS Symbol</i>	
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
<i>fixed date range</i>		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
orientation value	(ORIENT)	[xxx.xx or "unknown"] (degree (°)), e.g., 110.76	RE	1,1
status	(STATUS)	1 : permanent 5 : periodic/intermittend 6 : reserved 9 : mandatory	EN	0,*
scale minimum	(SCAMIN)	[260000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 [†]
Periodic Date Range			C	0,*
Date End	(DATEND)		(S) TD	1, 1
Date Start	(DATSTA)		(S) TD	1, 1
Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1

<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

15.10.1 Recommended traffic lane part

Recommended direction of traffic flow is a traffic flow pattern indicating a recommended directional movement of traffic where it is impractical or unnecessary to adopt an established direction of traffic flow. (IMO Ships Routeing, 2010). IMO-designated recommended directions of traffic flow are listed in IMO publication “*Ships’ Routeing*” Part E. Several hydrographic offices, in consultation with their Ministries of Transport, have added recommended directions in areas such as the outer approaches to major ports in order to show the best routes for crossing traffic or to minimise the risk of head-on encounters.

The feature **Recommended Traffic Lane Part** must be used, where required, to encode areas with a recommended direction of traffic flow which is generally along one bearing:

- between two traffic separation schemes (TSS);
- in the entrance area of a TSS.

Remarks:

- When the area is not defined, a point feature should be encoded.
- The orientation of the recommended traffic lane part is defined by the centreline of the part and is related to the general direction of traffic flow in the recommended traffic lane.

Distinction:

Inland specific Encoding Instructions:

15.11 Inshore traffic zone

IHO Definition: **INSHORE TRAFFIC ZONE.** A routeing measure comprising a designated area between the landward boundary of a traffic separation scheme and the adjacent coast, to be used in accordance with the provisions of the International Regulations for Preventing Collisions at Sea. (Adapted from IMO Ships' Routeing).

S-401 Geo Feature: Inshore Traffic Zone (ISTZNE) (M)

Primitives: Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
interoperability identifier		MRN (see clause 27.161)	URN	0,1
restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transhipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 27 : speed restricted 28 : Overtaking Prohibited 29 : Overtaking of Convoys by Convoys Prohibited 30 : Passing or Overtaking Prohibited 31 : Berthing Prohibited 32 : Berthing Restricted	EN	0,*

		33 : Making Fast Prohibited 34 : Making Fast Restricted 35 : Turning Prohibited 36 : Restricted Fairway Depth 37 : Restricted Fairway Width 38 : Use of Spuds Prohibited 40 : SOx Emission Restricted 41 : NOx Emission Restricted 43 : Passing or Overtaking of Convoys by Convoys Prohibited		
status	(STATUS)	1 : permanent 3 : recommended 6 : reserved 9 : mandatory 16 : watched 17 : unwatched	EN	0,*
<i>vessel speed limit</i>			C	0,*
speed limit			(S) RE	1,1
speed units		2 : kilometres per hour 3 : miles per hour 4 : knots	(S) EN	1,1
vessel class			(S) TE	0,1
scale minimum	(SCAMIN)	[260000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police	(S) EN	0, 1

		12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Component	Traffic Separation Scheme Aggregation (see clause 25.14)	Traffic Separation Scheme	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

† For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

15.11.1 Inshore traffic zones

The feature **Inshore Traffic Zone** must only be used to encode the designated area between the landward boundary of a traffic separation scheme and the adjacent coast.

Remarks:

- For additional guidance regarding the encoding of vessel speed limits, see clause 17.4.
- Inshore traffic zones are used to exclude most classes of through traffic. Traffic in an inshore traffic zone is separated from traffic in the adjacent traffic lane by a separation zone or line (see clause 15.14). An inshore traffic zone may be adjacent to a precautionary area (see clause 15.12).

Distinction: Precautionary Area; Separation Zone or Line; Traffic Separation Scheme Crossing; Traffic Separation Scheme Lane Part.

Inland specific Encoding Instructions:

15.12 Precautionary area

IHO Definition: **PRECAUTIONARY AREA.** A routeing measure comprising an area within defined limits where ships must navigate with particular caution and within which the direction of traffic flow may be recommended. (IMO Ships' Routeing).

S-401 Geo Feature: Precautionary Area (PRCARE) (M)

Primitives: Point, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
IMO adopted	(CATTSS)		BO	0,1
interoperability identifier		MRN (see clause 27.161)	URN	0,1
restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 14 : area to be avoided 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transhipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited	EN	0,*

		27 : speed restricted 28 : Overtaking Prohibited 29 : Overtaking of Convoys by Convoys Prohibited 30 : Passing or Overtaking Prohibited 31 : Berthing Prohibited 32 : Berthing Restricted 33 : Making Fast Prohibited 34 : Making Fast Restricted 35 : Turning Prohibited 36 : Restricted Fairway Depth 37 : Restricted Fairway Width 38 : Use of Spuds Prohibited 40 : SOx Emission Restricted 41 : NOx Emission Restricted 43 : Passing or Overtaking of Convoys by Convoys Prohibited		
status	(STATUS)	1 : permanent 9 : mandatory 28 : buoys	EN	0,*
<i>vessel speed limit</i>			C	0,*
speed limit			(S) RE	1,1
speed units		2 : kilometres per hour 3 : miles per hour 4 : knots	(S) EN	1,1
vessel class			(S) TE	0,1
scale minimum	(SCAMIN)	[260000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	1,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company	(S) EN	0, 1

		11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Component	Traffic Separation Scheme Aggregation (see clause 25.14)	Traffic Separation Scheme	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

15.12.1 Precautionary areas

Precautionary areas are commonly designated by IMO for certain areas of converging or crossing traffic, usually in association with traffic separation schemes. If it is required to encode such areas, it must be done using the feature **Precautionary Area**.

Remarks:

- To encode the relevant cautionary information, this must be done using the complex attribute **information** (see clause 2.4.6).
- For additional guidance regarding the encoding of vessel speed limits, see clause 17.4.
- A **Precautionary Area** feature may overlap other features encoded for the traffic separation scheme (for example **Traffic Separation Scheme Lane Part**, **Traffic Separation Scheme Crossing**).
- Where a **Precautionary Area** feature is included in the association **Traffic Separation Scheme Aggregation**, the attribute **IMO adopted** must not be populated for the **Precautionary Area** feature.

Distinction: Caution Area; Inshore Traffic Zone; Restricted Area; Separation Zone or Line; Traffic Separation Scheme Boundary; Traffic Separation Scheme Crossing; Traffic Separation Scheme Lane Part; Two-Way Route Part.

Inland specific Encoding Instructions:

15.13 Traffic separation scheme lane part

IHO Definition: TRAFFIC SEPARATION SCHEME LANE PART. An area within defined limits in which oneway traffic is established. Natural obstacles, including those forming separation zones, may constitute a boundary. (IHO Dictionary – S-32).

S-401 Geo Feature: Traffic Separation Scheme Lane Part (TSSLPT) (O)

Primitives: Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
interoperability identifier		MRN (see clause 27.161)	URN	0,1
orientation value	(ORIENT)	[xxx.xx or "unknown"] (degree (°)), e.g., 110.76	RE	0,1 [†]
restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transhipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 27 : speed restricted	EN	0,*

status	(STATUS)	1 : permanent 3 : recommended 6 : reserved 9 : mandatory 28 : buoyed	EN	0,*
<i>vessel speed limit</i>			C	0,*
speed limit			(S) RE	1,1
speed units		2 : kilometres per hour 3 : miles per hour 4 : knots	(S) EN	1,1
vessel class			(S) TE	0,1
scale minimum	(SCAMIN)	[260000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 [†]
Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
<i>.....Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed	(S) EN	0, 1

		9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data		
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Component	Traffic Separation Scheme Aggregation (see clause 25.14)	Traffic Separation Scheme	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] The attribute **orientation value** is mandatory for all **Traffic Separation Scheme Lane Part** features, unless the part is a junction.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

15.13.1 Traffic separation scheme lanes

A traffic lane is an area within defined limits in which one-way traffic flow is established. Natural obstacles, including those forming separation zones, may constitute a boundary. (IHO Dictionary – S-32). A complete traffic separation scheme lane consists of one or more areas within which the flow of traffic follows one defined direction. If it is required to encode these areas, this must be done using the feature **Traffic Separation Scheme Lane Part**.

Remarks:

- At junctions, other than crossings, a separate **Traffic Separation Scheme Lane Part** feature must be encoded. For this feature, the attribute **orientation value** must be omitted, in order to avoid implying that one lane has priority over another (see INT1 – M22). Warning text may be encoded

using the complex attribute **information** (see clause 2.4.6). In some cases, a precautionary area is established where routes meet or cross (see clause 15.12.1).

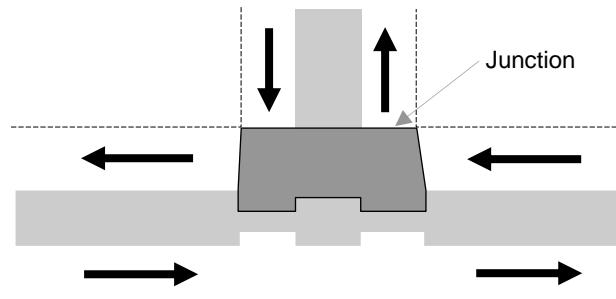


Figure 15-7 – Junction

- The orientation of the traffic separation scheme lane part is defined by the centreline of the part and is related to the general direction of traffic flow in the traffic separation lane.
- For additional guidance regarding the encoding of vessel speed limits, see clause 17.4.

Distinction: Recommended Traffic Lane Part; Separation Zone or Line; Traffic Separation Scheme Boundary; Traffic Separation Scheme Crossing.

Inland specific Encoding Instructions:

15.14 Separation zone or line

IHO Definition: **SEPARATION ZONE OR LINE.** A zone or line separating the traffic lanes in which ships are proceeding in opposite, or nearly opposite directions; or separating a traffic lane from an adjacent sea area; or separating traffic lanes designated for particular classes of ships proceeding in the same direction. (IHO Dictionary – S-32).

S-401 Geo Feature: Separation Zone or Line (*TSELNE*, *TSEZNE*) (C)

Primitives: Curve, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
status	(STATUS)	1 : permanent 3 : recommended 9 : mandatory 28 : buoyed	EN	0,*
scale minimum	(SCAMIN)	[260000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 [†]
Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police	(S) EN	0, 1

		4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Component	Traffic Separation Scheme Aggregation (see clause 25.14)	Traffic Separation Scheme	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

15.14.1 Separation zones and lines

The feature **Separation Zone or Line** must be used to encode the common boundary or separation areas between routeing measures as specified in IMO Ships' Routeing.

Remarks:

- No remarks.

Distinction: Traffic Separation Scheme Boundary; Traffic Separation Scheme Crossing; Traffic Separation Scheme Lane Part.

Inland specific Encoding Instructions:

- A) If a structured external XML-file with more detailed communication information is available, the reference to the file has to be entered in the **file reference** (TXTDSC) attribute.
- B) Use **status** (STATUS) if any of the conditions apply.
- C) EUR: Traffic Separation Zones must be encoded.

15.15 Traffic separation scheme boundary

IHO Definition: **TRAFFIC SEPARATION SCHEME BOUNDARY.** The outer limit of a traffic lane part or a traffic separation scheme roundabout. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.185, November 2000).

S-401 Geo Feature: Traffic Separation Scheme Boundary (TSSBND) (O)

Primitives: Curve

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
status	(STATUS)	1 : permanent 3 : recommended 9 : mandatory 28 : buoyed	EN	0,*
scale minimum	(SCAMIN)	[260000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 [†]
Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health	(S) EN	0, 1

		7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Component	Traffic Separation Scheme Aggregation (see clause 25.14)	Traffic Separation Scheme	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

15.15.1 Traffic separation scheme boundaries

The feature **Traffic Separation Scheme Boundary** must only be used to encode the outer limits of traffic lanes.

Remarks:

- **Traffic Separation Scheme Boundary** must not be used to encode the boundary between a traffic separation scheme lane and a traffic separation zone; or a traffic separation zone and an inshore traffic zone.

Distinction: Separation Zone or Line; Traffic Separation Scheme Crossing; Traffic Separation Scheme Lane Part.

Inland specific Encoding Instructions:

15.16 Traffic separation scheme crossing

<p>IHO Definition: TRAFFIC SEPARATION SCHEME CROSSING. A defined area where traffic lanes cross. (S57 Edition 3.1, Appendix A – Chapter 1, Page 1.186, November 2000).</p> <p>S-401 Geo Feature: Traffic Separation Scheme Crossing (TSSCRS) (O)</p> <p>Primitives: Surface</p>				
<p><i>Real World</i></p>				
		<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>	
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
<i>fixed date range</i>		See clause 2.4.8	C	0,1
<i>date end</i>	(DATEND)		(S) TD	0,1 [†]
<i>date start</i>	(DATSTA)		(S) TD	0,1 [†]
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>restriction</i>	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transhipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 27 : speed restricted	EN	0,*

status	(STATUS)	1 : permanent 3 : recommended 6 : reserved 9 : mandatory	EN	0,*
<i>vessel speed limit</i>			C	0,*
speed limit			(S) RE	1,1
speed units		2 : kilometres per hour 3 : miles per hour 4 : knots	(S) EN	1,1
vessel class			(S) TE	0,1
scale minimum	(SCAMIN)	[260000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports	(S) EN	0, 1

		10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data		
.....Source	(SORIND)		(S) TE	1,*
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Component	Traffic Separation Scheme Aggregation (see clause 25.14)	Traffic Separation Scheme	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

15.16.1 Traffic separation scheme crossing

The feature **Traffic Separation Scheme Crossing** must only be used to encode the area where at least four traffic lanes cross.

Remarks:

- For additional guidance regarding the encoding of vessel speed limits, see clause 17.4.
- Junctions other than crossings should be encoded using the feature **Traffic Separation Scheme Lane Part** (see clause 15.13).
- A **Traffic Separation Scheme Crossing** feature must not overlap a **Separation Zone or Line** feature of type surface at its centre.
- In some cases, a precautionary area is established where routes meet or cross (see clause 15.12.1).

Distinction: Separation Zone or Line; Traffic Separation Scheme Boundary; Traffic Separation Scheme Lane Part.

Inland specific Encoding Instructions:

15.17 Traffic separation scheme

IHO Definition: TRAFFIC SEPARATION SCHEME. A routeing measure aimed at the separation of opposing streams of traffic by appropriate means and by the establishment of traffic lanes. (IHO Dictionary – S-32).				
S-401 Geo Feature: Traffic Separation Scheme (M)				
Primitives: Surface, No Geometry				
Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
IMO adopted	(CATTSS)		BO	0,1
interoperability identifier		MRN (see clause 27.161)	URN	0,1
maximum permitted draught			RE	0,1
scale minimum	(SCAMIN)	[260000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NIINFOM)		(S) TE	0,1 †
Reported Date	(SORDAT)		TD	0, 1
Pictorial Representation	(PICREP)		TE	0, 1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1

<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 †
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Collection	Traffic Separation Scheme Aggregation (see clause 25.14)	Inshore Traffic Zone, Precautionary Area, Restricted Area, Separation Zone or Line, Traffic Separation Scheme, Traffic Separation Scheme Boundary, Traffic Separation Scheme Crossing, Traffic Separation Scheme Lane Part, Two-Way Route, Two-Way Route Part	Aggregation	0,1
The Component	Traffic Separation Scheme Aggregation (see clause 25.14)	Traffic Separation Scheme	Association	0,*

The Collection	Aids to Navigation Association (see clause 25.2)	Building, Bridge, Cardinal Beacon, Cardinal Buoy, Conveyor, Crane, Daymark, Dolphin, Emergency Wreck Marking Buoy, Fishing Facility, Floating Dock, Fortified Structure, Hulk, Isolated Danger Beacon, Isolated Danger Buoy, Landmark, Lateral Beacon, Lateral Buoy, Mooring Buoy, Offshore Platform, Pile, Pipeline Overhead, Pontoon, Pylon/Bridge Support, Safe Water Beacon, Safe Water Buoy, Shoreline Construction, Silo/Tank, Span Fixed, Span Opening, Special Purpose/General Beacon, Special Purpose/General Buoy, Structure Over Navigable Water, Wind Turbine	Aggregation	0,1
The Component	Caution Area Association (see clause 25.4)	Caution Area	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

15.17.1 Traffic separation schemes

If it is required to encode a traffic separation scheme (TSS), it must be done using:

- **Inshore Traffic Zone** (see clause 15.11);
- **Precautionary Area** (see clause 15.12);
- **Separation Zone or Line, Traffic Separation Scheme Boundary, Traffic Separation Scheme Crossing, Traffic Separation Scheme Lane Part**(see clauses 15.13 to 15.17); and
- Navigational aids features (see Sections 18 to 21).

To define the complete traffic separation scheme system, these features must be associated with the feature **Traffic Separation Scheme** using the association **Traffic Separation Scheme Aggregation** (see clause 25.14); and any associated aids to navigation should be associated with the **Traffic Separation Scheme** using the association **Aids to Navigation Association** (see clause 25.2).

Remarks:

- The name of the TSS must be populated using the complex attribute **feature name**. Where it is required for the name to be displayed in the Inland ECDIS or ECS, the **Traffic Separation Scheme** must be encoded using surface geometry. The extent of the geometry of the **Traffic Separation Scheme** should utilise the geometry of the components of the scheme so as to cover its full extent.
- Where it is required to encode an IMO declared Area to be Avoided within a TSS, this must be done using the feature **Restricted Area** (see clause 17.8), with attribute **restriction** = 14 (area to be avoided).
- Where it is required to populate textual information for the TSS, this should be done using the complex attribute **information** (see clause 2.4.6) for the **Traffic Separation Scheme**; or if the information is considered essential for safe navigation, using a **Caution Area** feature (see clause 16.11).
- All features comprising a traffic separation scheme must have the same value populated for the attribute **scale minimum** (see clause 2.5.9).
- Multiple **Traffic Separation Scheme** features may be further aggregated hierarchically using the association **Traffic Separation Scheme Aggregation** to define a higher TSS.

Distinction: Fairway System; Two-Way Route.

Inland specific Encoding Instructions:

15.18 Radio calling-in point

IHO Definition: RADIO CALLING-IN POINT. A designated position at which vessels are required to report to a Traffic Control Centre. Also called reporting point or radio reporting point. (IHO Dictionary – S-32).				
S-401 Geo Feature: Radio Calling-In Point (rdocal) (M)				
Primitives: Point, Curve				
Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
communication channel	(COMCHA)	[[XXXX];[XXXX];...]	TE	1,*
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
interoperability identifier		MRN (see clause 27.161)	URN	0,1
orientation value	(ORIENT)	[xxx.xx or "unknown"] (degree (°)), e.g., 110.76	RE	1,2
periodic date range		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
status	(STATUS)	1 : permanent 3 : recommended 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 9 : mandatory	EN	0,*
traffic flow	(TRAFIC)	1 : inbound 2 : outbound 3 : one-way 4 : two-way	EN	1,1
scale minimum	(SCAMIN)	[EUR: 45000, US: 60000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*

file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
Category of Communication	(catcom)	1 : VTS Centre 2 : VTS Sector 3 : IVS Point 4 : MIB 5 : Lock 6 : Bridge 7 : Custom 8 : Harbour	EN	1, *
UN Location Code	(unlocd)		TE	0, 1
Reported Date	(SORDAT)		TD	0, 1
Pictorial Representation	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *

<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Component	Bridge Aggregation (see clause 25.3)	Bridge	Association	0,*
The Component	Barrage Association (see clause 0)	Dam	Association	0,*
The Component	Lock Aggregation (see clause 25.23)	Lock Basin	Association	0,*
The Collection	Notice Mark Aggregation (see clause 0)	Notice Mark	Aggregation	0,*
The Component	Tunnel Aggregation (see clause 25.27)	Tunnel	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, NonStandard Working Day, Service Hours, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

15.18.1 Radio calling-in (reporting) points

Radio reporting points, also called radio calling-in points, have been established in certain busy waterways and port approaches to assist traffic control. On passing these points or crossing a defined line vessels are required to report on VHF to a Traffic Control Centre.

If it is required to encode a radio reporting point or line, it must be done using the feature **Radio Calling-In Point**.

Remarks:

- Each **Radio Calling-In Point** feature of type point must carry at least one orientation, using the attribute **orientation value**. If it is required to encode the reciprocal orientation, to indicate that a bearing and its opposite apply to a **Radio Calling-In Point** feature, it must be done using attribute

traffic flow = 4 (two-way). If the same position is used for another orientation (not opposite) of traffic flow, a second **orientation value** attribute must be encoded.

- The complex attribute **feature name**, sub-attribute **name** is used to encode the name and/or alphanumeric designator of the **Radio Calling-In Point**.
- The complex attribute **information** (see clause 2.4.6) is used to provide additional information, where required. For example, if the requirement to report by radio relates to certain classes of vessels only.
- **Radio Calling-In Point** features of type curve must be encoded such that resultant direction of the line (accounting for the direction of digitising and any subsequent reversal of the curve) is related such that the direction of traffic that is required to report is to the right.
- If it is required to encode the area of a Vessel Traffic Service (VTS) containing radio reporting points or requiring periodic position reporting, this should be done using the feature **Vessel Traffic Service Area** (see clause 22.2).
- Each VHF-channel should be indicated using the attribute **communication channel** (see clause 27.107). Alternately, if the same VHF-channel(s) apply to multiple features in the dataset, this should be indicated through an associated instance of the information type **Contact Details**, attribute **communication channel** (see clause 24.1).

Distinction: Radio Station; Pilot Boarding Place; Vessel Traffic Service Area.

Inland specific Encoding Instructions:

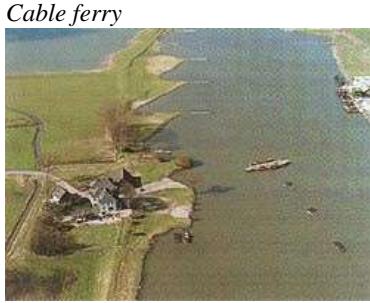
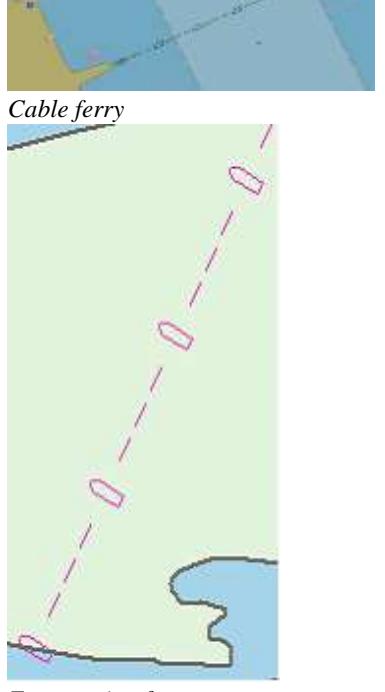
- A) If it's not a one-way route use **traffic flow** (TRAFIC) = 4 two-way in general. Use inbound (upstream) and outbound (downstream), if the obligation to report applies only to one direction of traffic.
- B) The attribute **orientation value** (ORIENT) is used to point in the direction of impact and enables to fix the pointer of the symbol
- C) **communication channel** (COMCHA) has to be used. The attribute "communication channel" encodes the various VHF-channels used for communication. Each VHF-channel should be indicated by 2 digits and can have up to 2 additional characters (A-Z); e.g., VHF-channel 7 -> 07'; VHF-channel 16 -> >16'; The indication of several VHF-channels is possible.
- D) 'catcom' should always be used.
- E) The use of curve features crossing the waterway is preferred, but it is not allowed to encode two different **Radio calling-in (reporting) points** (rdocal) features on the same curve.
- F) If a structured external XML-file with more detailed communication information is available, the reference to the file has to be entered in the **file reference** (TXTDSC) attribute.
- G) If there is a reporting duty at a specific point/line use **Radio Calling-In Point** (rdocal) feature. (Refer to 15.18)
- H) EUR: If the ISRS Location Code is available, it has to be encoded (see 2.4.13). If a maritime MRN or RIS-ID is available, the attribute **interoperability identifier** must be encoded (refer to Fehler! Verweisquelle konnte nicht gefunden werden.).

15.19 Ferry route

IHO Definition: **FERRY ROUTE.** A route in a body of water where a ferry crosses from one shoreline to another. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

S-401 Geo Feature: Ferry Route (FERYRT, feryrt) (C)

Primitives: Curve, Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>
 <i>Cable ferry</i>		 <i>Cable ferry</i>
 <i>Swinging wire ferry</i>		 <i>Free moving ferry</i>

S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of ferry	(CATFRY)	1 : free moving ferry 2 : cable ferry 3 : ice ferry 4 : swinging wire ferry 5 : high speed ferry	EN	1,*
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
fixed date range		See clause 2.4.8	C	0,1

date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
interoperability identifier		MRN (see clause 27.161)	URN	0,1
<i>periodic date range</i>		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
status	(STATUS)	1 : permanent 2 : occasional 3 : recommended 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 9 : mandatory 12 : illuminated 14 : public 16 : watched 17 : unwatched	EN	0,*
scale minimum	(SCAMIN)	[EUR: 45000, US: 60000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NIINFOM)		(S) TE	0,1 †
UN Location Code	(unlocd)		TE	0, 1
Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime	(S) EN	0, 1

		16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information, Non-Standard Working Days, Service Hours, Time Schedule In General	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

† Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

15.19.1 Ferries

Ferry routes should be encoded on the largest optimum display scale IENC datasets:

- where they cross fairly narrow channels, in order that through traffic is warned of their existence;
- where the ferry tracks are short enough to be reasonably accurately represented; and

- on IENCs used for harbour navigation, as part of the general information about the area.

If it is required to encode a ferry route, it must be done using the feature **Ferry Route**.

Remarks:

- Long distance ferries which have routes varying with weather, tide and traffic should not generally be encoded, although the terminals should be shown on appropriate optimum display scale IENC datasets, using the feature **Harbour Facility** (see clause 22.7), with attribute **category of harbour facility** = 1 (RoRo-terminal) or 3 (ferry terminal).

Distinction:

Inland specific Encoding Instructions:

- Code the route that connects the docks or mooring facilities used by the ferry.
- The route should be the path officially permitted by the relevant authority. If no such official designation exists, use the route typically used by the ferry vessel(s).
- Use **status** (STATUS) if any of the conditions apply.
- A ferry may use a high water route and low water route. Label in **information text** (INFORM) as "Used for Low Water" and "Used for High Water"
- If the ferry has a special time schedule or special operating hours apply, the object can be combined with a time schedule. For this purpose refer to the **Time Schedule (General)** feature 'tisdge' see 24.6
- If a structured external XML-file with more detailed communication information is available, the reference to the file has to be entered in the **file reference** (TXTDSC) attribute.
- EUR: If the ISRS Location Code is available, It must be encoded (refer to 2.4.13). If a maritime MRN or RIS-ID is available, the attribute **interoperability identifier** must be encoded (refer to **Fehler! Verweisquelle konnte nicht gefunden werden.**).
- Cable ferries (either assisted by propulsion or not) are fixed to a cable. This cable is crossing the river either above or below water surface
 - If the ferry is connected to a leading cable, which crosses the fairway above the water surface, this cable shall be encoded as an overhead cable.
- A swinging wire ferry is a route in a body of water where a ferry crosses from one shoreline to another. A "Swinging Wire Ferry" is connected to a fixed point (e.g., an anchor in the middle of the waterway) and swings around this point from shore to shore via a cable to an anchor. The cable runs more or less parallel to the current. (Digital Geographic Information Working Group, Oct.87)
 - Use **Special Purpose/General Buoy** with **category of special purpose mark** (CATSPM) =37 (ferry crossing mark) to encode the supporting pontoons.
 - For the cable between the ferry and the fixed point (e.g. anchor, mast) use a **Cable Area** (CBLARE) (not a **Cable Submarine** (CBLSUB) or **Cable Overhead** (cblohd)), as the position of the cable changes during the ride.
- Free moving ferry
 - If an officially designated route exists and a free moving ferry is crossing the waterway and not following the traffic flow it must be encoded.

15.20 Radar line

<p>IHO Definition: RADAR LINE. Recommended tracks along which ships can be guided by coastal radar stations in the event of bad visibility. (IHO Dictionary – S-32).</p>				
<p>S-401 Geo Feature: Radar Line (RADLNE) (O)</p>				
<p>Primitives: Curve</p>				
<i>Real World</i>	<i>Paper Chart Symbol</i> 		<i>Inland ECDIS or ECS Symbol</i> 	
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
interoperability identifier		MRN (see clause 27.161)	URN	0,1
orientation value	(ORIENT)	[xxx.xx or "unknown"] (degree (°)), e.g., 110.76	RE	1,1
status	(STATUS)	1 : permanent 2 : occasional 3 : recommended 4 : not in use 7 : temporary	EN	0,*
scale minimum	(SCAMIN)	[45000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 [†]
Reported Date	(SORDAT)		TD	0, 1
Pictorial Representation	(PICREP)		TE	0, 1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police	(S) EN	0, 1

		4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*
† Complex attribute feature name , sub-attribute name usage is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.				
For each instance of information , at least one of the sub-attributes file reference or text must be populated.				

15.20.1 Radar reference lines

Radar reference lines are mid-channel lines corresponding to lines incorporated in Vessel Traffic Services (VTS) radar displays. A line is used as a positional reference so that the VTS authorities may easily provide a vessel with its position, relative to the line, when visibility is poor. These must be charted on appropriate optimum display scale IENC data.

If it is required to encode a radar reference line, it must be done using the feature **Radar Line**.

Remarks:

- The value of orientation encoded on the mandatory attribute **orientation value** should be the value of the bearing from seaward. If it is not possible to define a seaward direction, the value that is less than 180° should be used.
- If it is required to encode the area of a VTS containing radar lines, this should be done using the feature **Vessel Traffic Service Area** (see clause 22.2).

Distinction: Radar Range; Recommended Track; Vessel Traffic Service Area.

Inland specific Encoding Instructions:

15.21 Radar range

IHO Definition: **RADAR RANGE.** Indicates the coverage of a sea area by a radar surveillance station. Inside this area a vessel may request shore-based radar assistance, particularly in poor visibility. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

S-401 Geo Feature: Radar Range (RADRNG) (O)

Primitives: Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
communication channel	(COMCHA)		TE	0,*
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
interoperability identifier		MRN (see clause 27.161)	URN	0,1
status	(STATUS)	1 : permanent 2 : occasional 3 : recommended 4 : not in use 7 : temporary	EN	0,*
scale minimum	(SCAMIN)	[EUR: 22000, US: 60000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
Reported Date	(SORDAT)		TD	0, 1
Pictorial Representation	(PICREP)		TE	0, 1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control	(S) EN	0, 1

		3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*
[†] Complex attribute feature name , sub-attribute name usage is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8. For each instance of fixed date range , at least one of the sub-attributes date end or date start must be populated. For each instance of information , at least one of the sub-attributes file reference or text must be populated.				

15.21.1 Radar ranges

Many large ports have a radar surveillance system covering their approaches to provide guidance for vessels, particularly in poor visibility. The maximum range of the system forms an arc or series of overlapping arcs.

If it is required to encode a radar range, it must be done using the feature **Radar Range**.

Remarks:

- Each VHF-channel should be indicated, using the attribute **communication channel** (see clause 27.107). Alternately, if the same VHF-channel(s) apply to multiple features in the dataset, this should be indicated through an associated instance of the information type **Contact Details**, attribute **communication channel** (see clause 24.1).

Distinction: Radar Line; Vessel Traffic Service Area.

Inland specific Encoding Instructions:

15.22 Radar station

IHO Definition: **RADAR STATION.** A station with a transmitter emitting pulses of ultra-high frequency radio waves which are reflected by solid objects and are detected upon their return to the sending station. (International Maritime Dictionary, 2nd Edition).

For IENCs the radar station of a VTS or a lock to locate vessels and/ or monitor the traffic.

S-401 Geo Feature: Radar Station (RADSTA) (O)

Primitives: Point

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
call sign	(CALSGN)		TE	0,1
category of radar station	(CATRAS)	1 : radar surveillance station 2 : coast radar station	EN	0,*
communication channel	(COMCHA)		TE	0,*
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
height	(HEIGHT)		RE	0,1
interoperability identifier		MRN (see clause 27.161)	URN	0,1
periodic date range		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private	EN	0,*
value of maximum range	(VALMXR)		RE	0,1
scale minimum	(SCAMIN)	[EUR: 22000, US: 60000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 [†]

Reported Date	(SORDAT)		TD	0, 1
Pictorial Representation	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

15.22.1 Radar station

If it is required to encode a radar station, it must be done using the feature **Radar Station**.

Remarks:

- Coast radar stations are shore-based stations which the boatmaster can contact by radio to obtain a position. These stations are being increasingly replaced by other position-fixing methods.
- The **Radar Station** must only be used to encode the technical equipment itself, independent of the building or structure in which it is installed. If it is required to encode the building or structure (for example mast, tower, radar dome) it must be done using an appropriate feature (for example **Building**, **Landmark**). There is no requirement to establish a Structure/Equipment association between the **Radar Station** feature and the structure in which it is installed.
- The attribute **height** is used to encode the height of the emitting part of the radar, where known.
- Each VHF-channel should be indicated, using the attribute **communication channel** (see clause 27.107). Alternately, if the same VHF-channel(s) apply to multiple features in the dataset, this should be indicated through an associated instance of the information type **Contact Details**, attribute **communication channel** (see clause 24.1).

Distinction: Radar Line; Radar Range; Radar Transponder Beacon.

Inland specific Encoding Instructions:

- A) The communication information of the VTS or lock to which the radar antenna belongs should be encoded by a **Communication Area** (comare) feature (22.13).

15.23 Waterway Area

IHO Definition: An area in which uniform general information of the waterway exists.				
S-401 Geo Feature: Waterway Area (wtware) (O)				
Super Type:				
Primitives: surface				
Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol	Type	Multiplicity
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Direction of Impact	(dirimp)	1 : Upstream 2 : Downstream 3 : To the Left Bank 4 : To the Right Bank 5 : To Harbour	EN	1, *
UN Location Code	(unlocd)		TE	0, 1
<i>feature name</i>		See clause 2.5.8	C	0, *
language		ISO 639-2/T	(S) TE	1, 1
name	(OBJNAM) (NOBJNM)		(S) TE	1, 1
name usage		1 : default name display 2 : alternate name display	(S) EN	0, 1 †
Scale Minimum	(SCAMIN)	[45000] or see clause 2.5.9	IN	1, 1
<i>Fixed Date Range</i>			C	0, 1
Date End	(DATEND)		(S) TD	0, 1
Date Start	(DATSTA)		(S) TD	0, 1
<i>Periodic Date Range</i>			C	0, *
Date End	(DATEND)		(S) TD	1, 1
Date Start	(DATSTA)		(S) TD	1, 1
Reported Date	(SORDAT)		TD	0, 1
Status	(STATUS)	5 : Periodic/Intermittent	EN	0, 1
Information	(INFORM)		C	0, *
File Locator			(S) TE	0, 1
File Reference	(TXTDSC)		(S) TE	0, 1
Headline			(S) TE	0, 1
Language			(S) TE	1, 1
Text	(INFORM) (NINFOM)		(S) TE	0, 1
Category of CEMT Class	(catccl)	1 : 0 Small Vessels and Pleasure Craft 2 : I Peniche 3 : II Campine Barge 4 : III Dortmund-Ems Barge 5 : IV Rhine-Herne Barge	EN	1, *

		6 : Va Large Rhine Barge; 1-Barge Push-Tow Unit 7 : Vb 2-Barge Push-Tow Unit; Long Formation 8 : Vla 2-Barge Push-Tow Unit; Wide Formation 9 : Vlb 4-Barge Push-Tow Unit 10 : Vlc 6-Barge Push-Tow Unit 11 : No CEMT Class 12 : VII 9-Barge Push-Tow Unit		
Pictorial Representation	(PICREP)		TE	0, 1
interoperability identifier		MRN (see clause 27.161)	URN	0, 1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0, *
language		ISO 639-2/T	(S) TE	1, 1
name	(OBJNAM) (NOBJNM)		(S) TE	1, 1
name usage		1 : default name display 2 : alternate name display	(S) EN	0, 1 †
Feature Associations				

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.17)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.11)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

Inland specific encoding instructions:

- A) **direction of impact** (dirimp), the orientation of the official distance numbering, is upstream if the official distance numbering increases towards the origin of a river and downstream if the numbering decreases towards the origin of a river. Otherwise, e.g., in case of a canal, downstream is in the direction of the general water flow or to be decided arbitrarily
- B) EUR: If the ISRS Location Code is available, it has to be encoded (refer to 2.4.13). If a maritime MRN or RIS-ID is available, the attribute **interoperability identifier** must be encoded (refer to Fehler! Verweisquelle konnte nicht gefunden werden.).

15.24 Waterway Axis

IHO Definition: The waterway axis can be defined as, for example: - The middle line of a fairway, (Definition of fairway: That part of a river, harbour; etc. where the main navigable channel for vessels of larger size lies. It is also the usual course followed by vessels entering or leaving harbours, called "ship channel". (International Maritime Dictionary, 2nd Ed.)). - The middle line of a water way (Definition of waterway: The waterway covers the entire area of a river or canal).

S-401 Geo Feature: Waterway Axis (wtwaxs) (C)

Super Type:

Primitives: curve

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol			
S-401 Attribute		S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
feature name			See clause 2.5.8	C	1, *
language			ISO 639-2/T	(S) TE	1, 1
name		(OBJNAM) (NOBJNM)		(S) TE	1, 1
name usage			1 : default name display 2 : alternate name display	(S) EN	0, 1 †
Scale Minimum		(SCAMIN)	[EUR: 22000, US: 45000] or see clause 2.5.9	IN	1, 1
<i>Fixed Date Range</i>				C	0, 1
Date End		(DATEND)		(S) TD	0, 1
Date Start		(DATSTA)		(S) TD	0, 1
<i>Periodic Date Range</i>				C	0, *
Date End		(DATEND)		(S) TD	1, 1
Date Start		(DATSTA)		(S) TD	1, 1
Reported Date		(SORDAT)		TD	0, 1
Status		(STATUS)	5 : Periodic/Intermittent	EN	0, 1
Information		(INFORM)		C	0, *
File Locator				(S) TE	0, 1
File Reference		(TXTDSC)		(S) TE	0, 1
Headline				(S) TE	0, 1
Language				(S) TE	1, 1
Text		(INFORM) (NINFOM)		(S) TE	0, 1
Category of CEMT Class		(catccl)	1 : 0 Small Vessels and Pleasure Craft 2 : I Peniche	EN	0, *

		3 : II Campine Barge 4 : III Dortmund-Ems Barge 5 : IV Rhine-Herne Barge 6 : Va Large Rhine Barge; 1-Barge Push-Tow Unit 7 : Vb 2-Barge Push-Tow Unit; Long Formation 8 : Vla 2-Barge Push-Tow Unit; Wide Formation 9 : Vlb 4-Barge Push-Tow Unit 10 : Vlc 6-Barge Push-Tow Unit 11 : No CEMT Class 12 : VII 9-Barge Push-Tow Unit		
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0, *
<i>language</i>		ISO 639-2/T	(S) TE	1, 1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1, 1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0, 1 †

Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.17)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Spatial Association (see clause 25.11)	Spatial Quality	Association	0,*

† Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

Inland specific encoding instructions:

- A) EUR: The waterway axis must be encoded if an IENC is intended to be used for navigation mode.
- B) If a fairway exists, the middle line of the fairway shall be used to define the waterway axis.
- C) For an update of an existing IENC, if possible, the **Waterway Axis** (wtwaxs) should be based on the middle line of a fairway rather than the middle line of a waterway. (For EU Member States: The replacement of an axis can be done in connection with the fulfilment of the minimum requirements set out in article 4 of the European RIS Directive.)
- D) Ideally, the **Waterway Axis** should be a continuous line that marks, at every position, the middle line of a fairway. If this is not feasible, the axis can be built as a lineal connection between points that show the middle line of the fairway every 100 metres (= 1/10 kilometre) or 1/10 mile, 1/10 sea mile etc.
- E) For distance marks along the waterway axis see 8.10.
- F) In case of two different systems of waterway distances in one area, one of them has to be selected for the waterway axis.

15.25 Waterway Profile

<p>IHO Definition: A physically non-existent line which is normally the connection of two opposite distance marks. Waterway profiles can be used to define a special water level.</p>				
<p>S-401 Geo Feature: Waterway Profile (wtwprf) (C)</p>				
<p>Super Type:</p>				
<p>Primitives: curve</p>				
Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
				
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Height	(HEIGHT)	[xxx.x] metres, e.g., 27.4	RE	0, 1
Vertical Datum	(VERDAT) (Datum Level) (Reference Plane) (Levelling Datum) (Datum for Sounding Reduction) (Datum for Heights)	10 : Approximate Lowest Astronomical Tide 12 : Mean Lower Low Water 23 : Lowest Astronomical Tide 24 : Local Datum 31 : Local Low Water Reference Level 32 : Local High Water Reference Level 33 : Local Mean Water Reference Level 34 : Equivalent Height of Water (German GIW) 35 : Highest Shipping Height of Water (German HSW) 36 : Reference Low Water Level According to Danube Commission 37 : Highest Shipping Height of Water According to Danube Commission 38 : Dutch River Low Water Reference Level (OLR) 39 : Russian Project Water Level 40 : Russian Normal Backwater Level 41 : Ohio River Datum 43 : Dutch High Water Reference Level 45 : Dutch Estuary Low Water Reference Level (OLW)	EN	0, 1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1

name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
Scale Minimum	(SCAMIN)	[EUR: 12000, US: 18750] or see clause 2.5.9	IN	1, 1
<i>Fixed Date Range</i>			C	0, 1
Date End	(DATEND)		(S) TD	0, 1
Date Start	(DATSTA)		(S) TD	0, 1
<i>Periodic Date Range</i>			C	0, *
Date End	(DATEND)		(S) TD	1, 1
Date Start	(DATSTA)		(S) TD	1, 1
Reported Date	(SORDAT)		TD	0, 1
Status	(STATUS)	5 : Periodic/Intermittent	EN	0, 1
Name of Sounding Datum Reference Level	(sdrlev)		TE	0, 1
Sounding Datum Reference Level Value	(sd rval)	[xx.xx] (metres), e.g., 2.05	RE	0, 1
Vertical Uncertainty	(VERACC)		C	0, 1
Uncertainty Fixed	(POSACC) (SOUACC) (VERACC)	[xx.xx] (metres), e.g., 1.54	(S) RE	1, 1
Uncertainty Variable Factor			(S) RE	0, 1
Category of Temporal Variation	(CATTEV)	4 : Likely to Change 5 : Unlikely to Change 6 : Unassessed	EN	0, 1
<i>Information</i>	(INFORM)		C	0, *
File Locator			(S) TE	0, 1
File Reference	(TXTDSC)		(S) TE	0, 1
Headline			(S) TE	0, 1
Language			(S) TE	1, 1
Text	(INFORM) (NINFOM)		(S) TE	0, 1
Reference Gravitational Level	(reflev)	1 : Baltic Datum 2 : Adriatic Level 3 : Amsterdam Ordnance Datum (NAP) 4 : Mean Sea Level 5 : Other Datum 6 : National Geodetic Vertical Datum - NGVD29 7 : North American Vertical Datum - NAVD88 8 : Mean Sea Level 1912 9 : Mean Sea Level 1929 10 : Tweede Algemene Waterpassing	EN	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Waterway Distance	(wtwdis)	[xxxx.xxx] (units defined in distance unit of measurement), e.g., 2451.732	RE	1, 1
distance unit of measurement	(hunits)	1 : metres	EN	0, 1

		2 : yards 3 : kilometres 4 : statute miles 5: nautical miles 7 : hectometres		
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 †
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.17)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Spatial Association (see clause 25.11)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

Inland specific encoding instructions:

- A) If waterway profiles are used on a waterway, the spacing of the waterway profiles depends on the local slope of the water level. The most common spacing is every one hundred metres. Preferably the location of waterway profiles coincides with distance marks ashore.
- B) **height** (HEIGHT) refers to the reference level within the attribute **reference gravitational level** (reflev).
- C) If detailed depths for water level model are provided waterway profiles must be encoded in order to be able to assign a **waterway distance** to the **Depth Area** (See 11.6 Detailed Depth - water level model).
- D) Use **name of sounding datum reference level** (sdrlev) and **sounding datum reference level value** (sdrvval) if the local value and name of vertical river datum reference level (design waterlevel) is known.

15.26 Turning Basin

<u>IHO Definition:</u> An area of water or enlargement of a channel used for turning vessels.				
S-401 Geo Feature: Turning Basin (trnbsn) (C)				
<u>Super Type:</u>				
<u>Primitives:</u> point, surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>		<i>Inland ECDIS or ECS Symbol</i>	
				
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Horizontal Clearance Value	(HORCLR)		RE	0, 1
UN Location Code	(unlocd)		TE	0, 1
feature name		See clause 2.5.8	C	0, *
language		ISO 639-2/T	(S) TE	1, 1
name	(OBJNAM) (NOBJNM)		(S) TE	1, 1
name usage		1 : default name display 2 : alternate name display	(S) EN	0, 1 †
Scale Minimum	(SCAMIN)	[EUR: 22000, US: 75000] or see clause 2.5.9	IN	1, 1
<i>Fixed Date Range</i>			C	0, 1
Date End	(DATEND)		(S) TD	0, 1
Date Start	(DATSTA)		(S) TD	0, 1
<i>Periodic Date Range</i>			C	0, *
Date End	(DATEND)		(S) TD	1, 1
Date Start	(DATSTA)		(S) TD	1, 1
Reported Date	(SORDAT)		TD	0, 1
Status	(STATUS)	5 : Periodic/Intermittent	EN	0, 1
Information	(INFORM)		C	0, *
File Locator			(S) TE	0, 1
File Reference	(TXTDSC)		(S) TE	0, 1
Headline			(S) TE	0, 1
Language			(S) TE	1, 1
Text	(INFORM) (NINFOM)		(S) TE	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
interoperability identifier		MRN (see clause 27.161)	URN	0, 1

Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Collection	Notice Mark Aggregation (see clause 0)	Notice Mark	Aggregation	0,*
The Updated Object	Updated Information (see clause 25.17)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.11)	Spatial Quality	Association	0,*

† Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

Inland specific encoding instructions:

- A) Use **Turning Basin** (trnbsn) feature
- B) EUR: If the ISRS Location Code is available it has to be encoded (refer to 2.4.13). If a maritime MRN or RIS-ID is available, the attribute **interoperability identifier** must be encoded (refer to **Fehler! V erweisquelle konnte nicht gefunden werden.**).
- C) EUR: Turning Basins must be encoded.
- D) **horizontal clearance value** (HORCLR) is the width of the basin, which is available for safe navigation. This may, or may not, be the same as the total physical width of the basin.

16 Geo Features – Areas, limits

16.1 International boundaries and national limits

The United Nations Convention on the Law of the Sea (UNCLOS), 1982 came into force on 16 November 1994. UNCLOS contains navigational provisions as well as provisions for determining the limits of various maritime zones. These provisions are binding to all states that have ratified the Convention. For technical aspects of UNCLOS, see IHO publication C-51.

IHO Member States should show, on selected series of their IENCs, their own baseline and maritime limits in accordance with UNCLOS.

The boatmaster may be interested in the exact location of international boundaries for two principal reasons:

- When crossing a boundary they could be subject to different laws and regulations which may affect their navigation; for example buoyage systems, pilotage regulations, fishing rights, reporting procedures, pollution regulations.
- Where a boundary passes through groups of offshore islands they may wish to know upon which side of the boundary a particular island falls.

16.2 Maritime jurisdiction areas

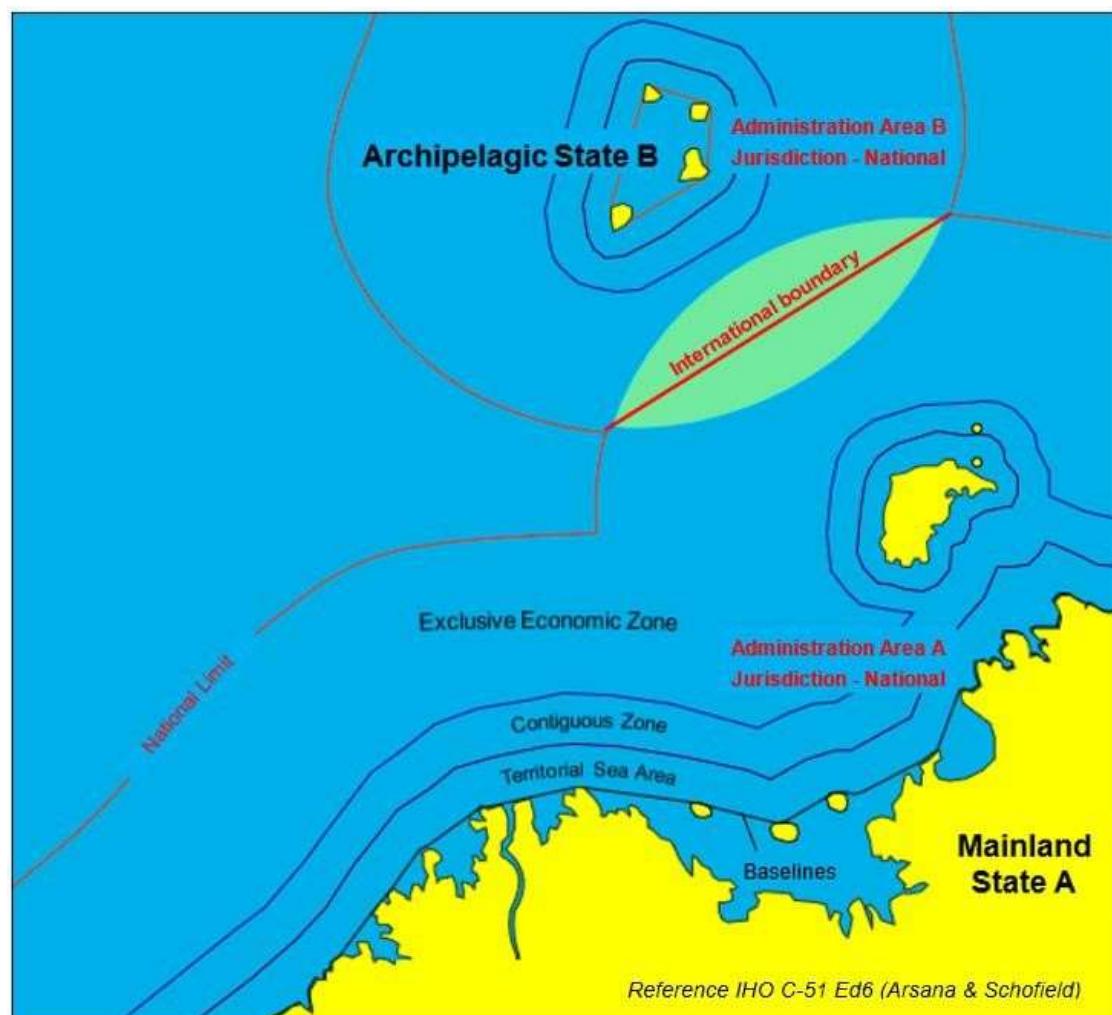


Figure 16-1 – Maritime jurisdiction areas

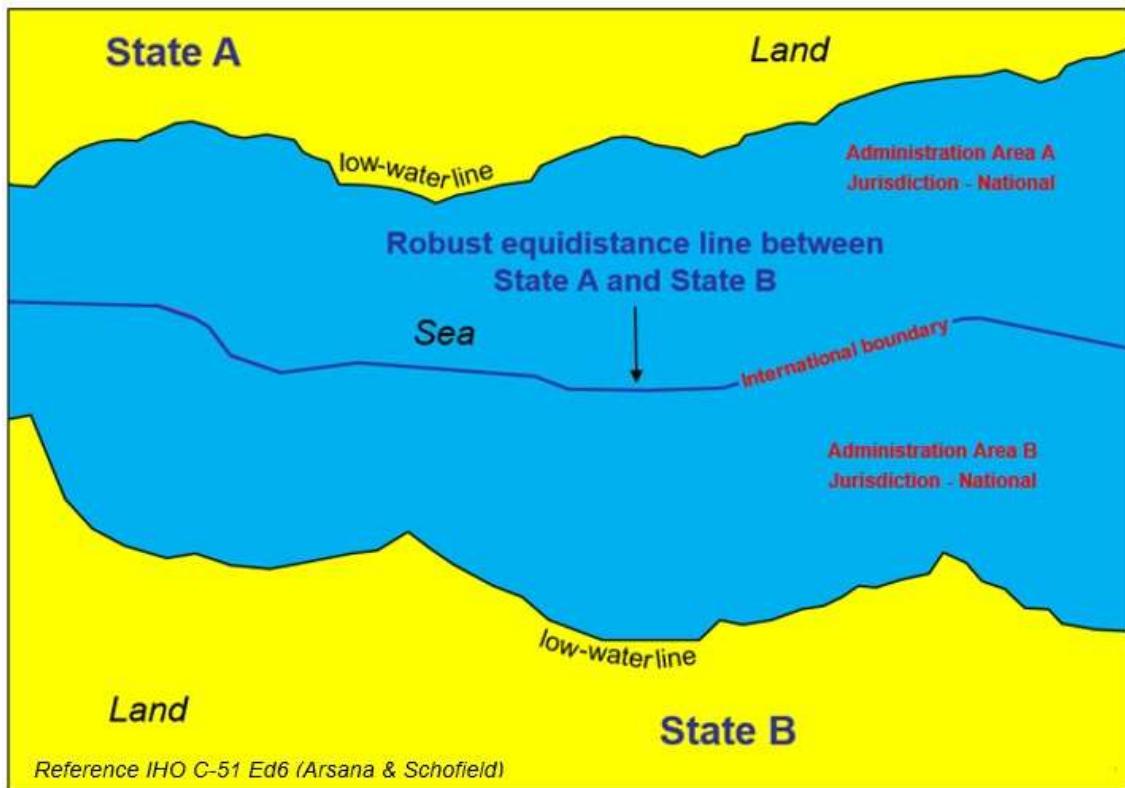


Figure 16-2 – Maritime jurisdiction areas in constrained waters

The clauses in Section 16 below provide guidance for the encoding of jurisdiction areas. Occasionally, these “areas” may actually be defined as linear due to international treaties; or the areas may not be fully defined and it may therefore be necessary to encode the boundary as a linear feature (see example at Figure 16-3 below). Clause 2.3 defining features permitted for use in IENC and their geometric primitives allows relevant feature classes relating to jurisdiction areas to be encoded as type curve; however this must only be done in circumstances where it is not possible to encode the feature using geometric primitive surface.



Figure 16-3 – Maritime jurisdiction – areas cannot be defined

In Figure 16-3, Administration Areas A and B cannot be encoded using geometric primitive surface as the seaward edge of the areas is not defined. In this case, the section of the international boundary extending seaward from the low water line should be encoded as an **Administration Area** feature of type curve (see clause 16.9).

16.3 Anchorage area

IHO Definition: **ANCHORAGE AREA.** An area in which vessels or seaplanes anchor or may anchor. (Adapted from IHO Dictionary – S-32).

S-401 Geo Feature: Anchorage Area (achare) (C)

Primitives: Point, Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of anchorage	(CATACH)	1 : unrestricted anchorage 2 : deep water anchorage 3 : tanker anchorage 4 : explosives anchorage 5 : quarantine anchorage 6 : seaplane anchorage 7 : small craft anchorage 8 : small craft mooring area 9 : anchorage for periods up to 24 Hours 10 : anchorage for a limited period of time 11 : Anchorage for Other Vessels than Pushing-Navigation Vessels 12 : Anchorage for Dry Cargo Vessels 13 : Anchorage for Rafts 14 : waiting anchorage 15 : reported anchorage 16 : Anchorage for Pushing-Navigation Vessels	EN	0,*
category of cargo		1 : bulk 2 : container 3 : general 4 : liquid 5 : passenger 6 : livestock 7 : dangerous or hazardous 8 : heavy lift 9 : ballast 10 : dry bulk cargo 11 : liquid bulk cargo 12 : reefer container cargo 13 : Ro-Ro cargo 14 : project cargo 15 : break bulk cargo	EN	0,*
feature name		See clause 2.5.8	C	0,*

language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
<i>fixed date range</i>		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
interoperability identifier		MRN (see clause 27.161)	URN	0,1
<i>periodic date range</i>		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 7 : entry prohibited 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 15 : construction prohibited 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 23 : cargo transhipment (lightening) prohibited 24 : dragging prohibited 27 : speed restricted 28 : Overtaking Prohibited 29 : Overtaking of Convoys by Convoys Prohibited 30 : Passing or Overtaking Prohibited 31 : Berthing Prohibited 32 : Berthing Restricted 33 : Making Fast Prohibited 34 : Making Fast Restricted 35 : Turning Prohibited 36 : Restricted Fairway Depth 38 : Use of Spuds Prohibited 39 : swimming prohibited	EN	0,*

status	(STATUS)	1 : permanent 2 : occasional 3 : recommended 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 9 : mandatory 12 : illuminated 14 : public 16 : watched 17 : unwatched	EN	0,*
vessel speed limit			C	0,*
speed limit			(S) RE	1,1
speed units		2 : kilometres per hour 3 : miles per hour 4 : knots	(S) EN	1,1
vessel class			(S) TE	0,1
scale minimum	(SCAMIN)	[EUR: 22000 for surfaces and 12000 for points, US: 45000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
UN Location Code	(unlocd)		TE	0, 1
Nature of Surface	(NATSUR)	1 : Mud 2 : Clay 3 : Silt 4 : Sand 5 : Stone 6 : Gravel 7 : Pebbles 8 : Cobbles 9 : Rock 11 : Lava 14 : Coral 17 : Shells 18 : Boulder	EN	0,*
Class of Dangerous Cargo	(clsdng)	1 : One Blue Light / Cone 2 : Two Blue Lights / Cones 3 : Three Blue Lights / Cones 4 : No Blue Light / Cone 5 : One Red Light / Red Cone Top Down	EN	0, 1

Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Collection	Anchorage Or Berth Aggregation (see clause 25.18)	Anchor Berth, Berth, Bollard, Bunker Station, Communication Area, Mooring Area, Mooring Buoy, Notice Mark, Pile, Refuse Dump, Restricted	Association	0,*

		Area, Shoreline Construction, Terminal, Vehicle Transfer		
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, NonStandard Working Day, Service Hours, Nautical Information, Time Schedule In General	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

16.3.1 Anchorages

Where the limits of anchorages are defined by a regulatory authority (for example harbour authority) they must be shown on the largest optimum display scale IENC data. They may also be shown on other optimum display scale IENC datasets where useful, for example, for planning purposes.

If it is required to encode an anchorage area, including anchorages for seaplanes, it must be done using the feature **Anchorage Area**.

Remarks:

- The complex attribute **feature name**, sub-attribute **name** is used to encode the name and/or number of the **Anchorage Area**.
- The complex attribute **information** (see clause 2.4.6) may be used to provide additional information about the category of anchorage, where required.
- Individual recommended anchorages without defined limits should be encoded as **Anchorage Area** features of type point, with attributes **category of anchorage** = 1 (unrestricted anchorage) and **status** = 3 (recommended).

If it is required to encode an anchorage at a location that has not been defined by a regulatory authority but has been reported to be suitable and safe for anchoring, this must be done using **Anchorage Area** of type point, with attribute **category of anchorage** = 15 (reported anchorage). NOTE: the encoding of **Anchorage Area** with attribute **category of anchorage** = 15 (reported anchorage) of type surface is prohibited.

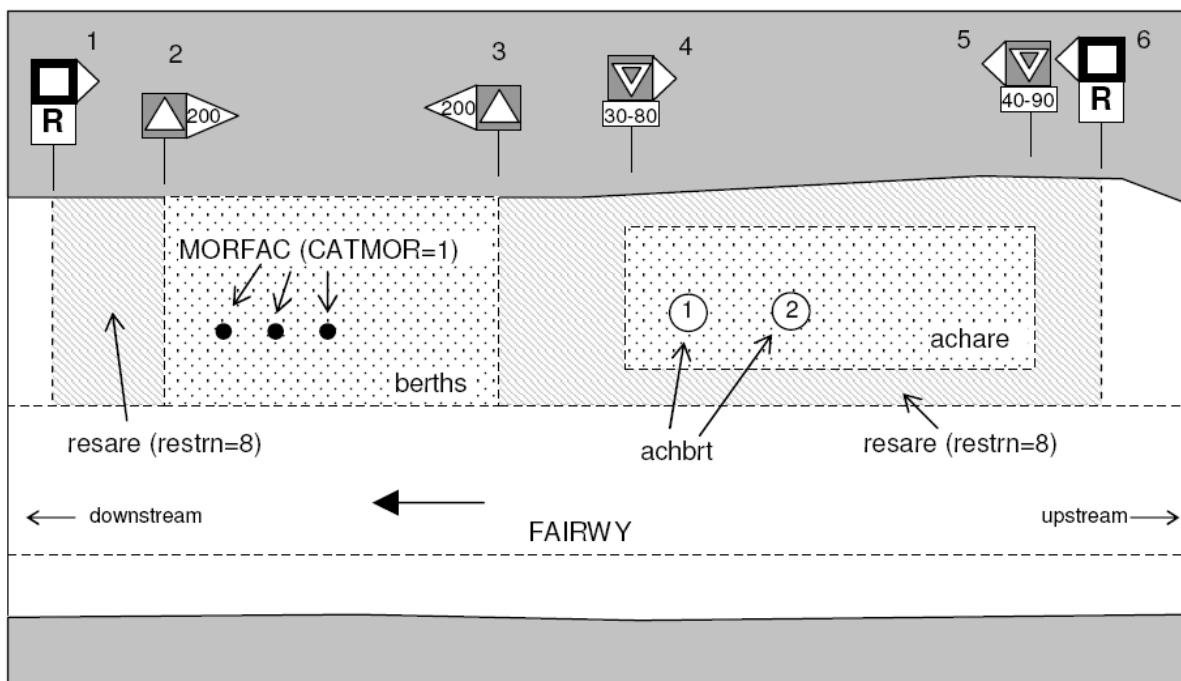
- If it is required to encode an anchorage which may be used for a period of not more than 24 hours, it must be done using **category of anchorage** = 9 (anchorage for periods up to 24 hours).
- If it is required to encode an anchorage with a specific, limited time period, it must be done using **category of anchorage** = 10 (anchorage for limited period of time). The specific limit of time should be encoded using the complex attribute **information** (see clause 2.4.6), sub-attribute **text** (for example *Anchorage limited to 12 hours*).
- Areas with numerous small craft moorings may be encoded using the feature **Mooring Area** (see clause 16.4). For the encoding of mooring buoys, see clause 20.8.
- For additional guidance regarding the encoding of vessel speed limits, see clause 17.4.

- Areas where anchoring is prohibited must be encoded, where required, as **Restricted Area** (see clause 17.8) with attribute **restriction** = 1 (anchoring prohibited).

Distinction: Anchor Berth; Mooring Area.

Inland specific Encoding Instructions:

- For **Anchor Berth** see 16.5
- If there is a time schedule referring to special dates or times, use Time Schedule – In General (tisdge) (see 24.6).
- EUR: The linear extent of **Anchorage Areas** (achare) features is defined by markers or **Notice Marks** (signs E.5 – E.5.15 or E.6) on the bank.
- If the name of the anchorage is important for navigation and should be displayed without the use of the pick report, use **Sea Area** (SEAARE) feature additional.
- If a structured external XML-file with more detailed communication information is available, the reference to the file has to be entered in the **file reference** (TXTDSC) attribute.
- The **class of dangerous goods** in accordance with ADN and the applicable police regulations: 1 (one blue light/cone, signs E.5.5, E.5.9, E.5.13), 2 (two blue lights/cones, signs E.5.6, E.5.10, E.5.14), 3 (three blue lights/cones, signs E.5.7, E.5.11, E.5.15), 4 (no blue lights/cones, signs E.5.4, E.5.8, E.5.12). Dangerous goods in accordance with inland waterway regulations of the Russian Federation: 5 (one red light/cone top down).
- EUR: If the ISRS Location Code is available, it has to be encoded (please refer to 2.4.13). If a maritime MRN or RIS-ID is available, the attribute **interoperability identifier** must be encoded (refer to **Fehler! Verweisquelle konnte nicht gefunden werden.**).
- EUR: **Anchorage Areas** must be encoded.
- EUR: If the authority has extended the application of the prohibition of anchoring to the use of telescopic piles (spuds), **restriction** (RESTRN) =38 (use of spuds prohibited) must be encoded.



achare	Anchorage Area (this page)
achbrt	Anchor Berth (see 16.5)
berths	Berth (see 8.14)

FAIRWY	Fairway (see 15.5)		
MORFAC	Mooring Facility (see 8.15, 8.16 or 20.8)		
resare	Restricted Area (see 17.8)	CATMOR restrn	category of mooring facility (see 27.58) restriction (see 27.217)

16.4 Mooring area

IHO Definition: MOORING AREA. An area in which vessels may be secured to mooring buoys (adapted from IHO dictionary – S-32).				
S-401 Geo Feature: Mooring Area (achare) (C)				
Primitives: Point, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of mooring area	(CATACH)	1 : small craft mooring area 2 : mooring area for visitors 3 : mooring area for tankers	EN	0,*
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
<i>fixed date range</i>		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
interoperability identifier		MRN (see clause 27.161)	URN	0,1
maximum permitted draught	(INFORM) (NINFORM)		RE	0,1
maximum permitted vessel length	(INFORM) (NINFORM)		RE	0,1
<i>periodic date range</i>		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake	EN	0,*

		15 : construction prohibited 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 23 : cargo transhipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 27 : speed restricted 28 : Overtaking Prohibited 29 : Overtaking of Convoys by Convoys Prohibited 30 : Passing or Overtaking Prohibited 31 : Berthing Prohibited 32 : Berthing Restricted 33 : Making Fast Prohibited 34 : Making Fast Restricted 35 : Turning Prohibited 36 : Restricted Fairway Depth 37 : Restricted Fairway Width 38 : Use of Spuds Prohibited 39 : swimming prohibited 41 : NOx Emission Restricted 42 : power-driven vessels prohibited 43 : Passing or Overtaking of Convoys by Convoys Prohibited		
status	(STATUS)	1 : permanent 2 : occasional 3 : recommended 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 9 : mandatory 14 : public	EN	0,*
scale minimum	(SCAMIN)	[EUR: 22000 for surfaces and 12000 for points, US: 45000] or see clause 2.5.9	IN	1,1
vessel speed limit			C	0,*
speed limit			(S) RE	1,1
speed units		2 : kilometres per hour 3 : miles per hour 4 : knots	EN	1,1
vessel class			(S) TE	0,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1

file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
Class of Dangerous Cargo	(clsdng)	1 : One Blue Light / Cone 2 : Two Blue Lights / Cones 3 : Three Blue Lights / Cones 4 : No Blue Light / Cone 5 : One Red Light / Red Cone Top Down	EN	0, 1
Reported Date	(SORDAT)		TD	0, 1
Maximum Permitted Vessel Length			RE	0, 1
Pictorial Representation	(PICREP)		TE	0, 1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1

name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
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Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Component	Anchorage Or Berth Aggregation (see clause 25.18)	Anchorage Area, Anchor Berth, Berth	Aggregation	0,*
The Collection	Anchorage Or Berth Aggregation (see clause 25.18)	Anchor Berth, Berth, Bollard, Bunker Station, Communication Area, Mooring Buoy, Notice Mark, Pile, Refuse Dump, Restricted Area, Shoreline Construction, Terminal, Vehicle Transfer	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, NonStandard Working Day, Service Hours, Nautical Information, Time Schedule In General	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

16.4.1 Mooring area

Where the limits of a mooring area are defined by a regulatory authority (for example harbour authority) they must be shown on the largest optimum display scale IENC data. They may also be shown on other optimum display scale IENC datasets (at smaller scales, if required, using the point primitive) where useful; for example, for planning purposes.

If it is required to encode a mooring area, it must be done using the feature **Mooring Area**.

Remarks:

- The complex attribute **feature name**, sub-attribute **name** is used to encode the name and/or number of the **Mooring Area**.
- The complex attribute **information** (see clause 2.4.6) may be used to provide additional information about the category of anchorage, where required.
- For the encoding of mooring buoys, see clause 20.8. For encoding installation buoys used for loading or unloading tankers, see clause 20.7.

Distinction: Anchorage Area; Anchor Berth; Mooring Buoy; Mooring Trot.

Inland specific Encoding Instructions:

- A) For **Anchor Berth** see 16.5
- B) If there is a time schedule referring to special dates or times, use **Time Schedule – In General** feature(tisdge) (see 24.6).
- C) If the name of the **Mooring Area** is important for navigation and should be displayed without the use of the pick report, use **Sea Area** (SEAARE) feature additional.
- D) If a structured external XML-file with more detailed communication information is available, the reference to the file has to be entered in the **file reference** (TXTDSC) attribute.
- E) The **class of dangerous cargo** in accordance with ADN and the applicable police regulations:
1 (one blue light/cone, signs E.5.5, E.5.9, E.5.13), 2 (two blue lights/cones, signs E.5.6, E.5.10, E.5.14), 3 (three blue lights/cones, signs E.5.7, E.5.11, E.5.15), 4 (no blue lights/cones, signs E.5.4, E.5.8, E.5.12). Dangerous goods in accordance with inland waterway regulations of the Russian Federation: 5 (one red light/cone top down).
- F) EUR: If the ISRS Location Code is available, it has to be encoded (please refer to 2.4.13). If a maritime MRN or RIS-ID is available, the attribute **interoperability identifier** must be encoded (refer to **Fehler! Verweisquelle konnte nicht gefunden werden.**).
- G) EUR: **Mooring Areas** must be encoded.

16.5 Anchor berth

IHO Definition: **ANCHOR BERTH.** A designated area of water where a vessel, seaplane, etc. may anchor. (IHO Dictionary – S-32).

For IENCs a designated area of water where a single vessel, convoy, sea plane, etc. may anchor.

S-401 Geo Feature: Anchor Berth (achbrt) (C)

Primitives: Point, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of anchorage	(CATACH)	1 : unrestricted anchorage 2 : deep water anchorage 3 : tanker anchorage 4 : explosives anchorage 5 : quarantine anchorage 6 : seaplane anchorage 7 : small craft anchorage 8 : Small craft mooring area 9 : anchorage for periods up to 24 Hours 10 : anchorage for a limited period of time 11 : Anchorage for Other Vessels than Pushing-Navigation Vessels 12 : Anchorage for Dry Cargo Vessels 13 : Anchorage for Rafts 14 : waiting anchorage 16 : Anchorage for Pushing-Navigation Vessels	EN	0,*
category of cargo		1 : bulk 2 : container 3 : general 4 : liquid 5 : passenger 6 : livestock 7 : dangerous or hazardous 8 : heavy lift 9 : ballast 10 : dry bulk cargo 11 : liquid bulk cargo 12 : reefer container cargo 13 : Ro-Ro cargo 14 : project cargo 15 : break bulk cargo	EN	0,*
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1

name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
<i>fixed date range</i>		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
interoperability identifier		MRN (see clause 27.161)	URN	0,1
<i>periodic date range</i>		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
<i>radius</i>	(RADIUS)	Metres	RE	0,1
status	(STATUS)	1 : permanent 2 : occasional 3 : recommended 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 9 : mandatory 12 : illuminated 14 : public 16 : watched 17 : unwatched	EN	0,*
scale minimum	(SCAMIN)	[EUR: 22000 for surfaces and 12000 for points, US: 45000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 [†]
Restriction	(RESTRN)	1 : Anchoring Prohibited 2 : Anchoring Restricted 7 : Entry Prohibited 8 : Entry Restricted 13 : No Wake 14 : Area To Be Avoided 27 : Speed Restricted 28 : Overtaking Prohibited 29 : Overtaking of Convoys by Convoys Prohibited 30 : Passing or Overtaking Prohibited 31 : Berthing Prohibited	EN	0, *

		32 : Berthing Restricted 33 : Making Fast Prohibited 34 : Making Fast Restricted 35 : Turning Prohibited 36 : Restricted Fairway Depth 38 : Use of Spuds Prohibited		
Nature of Surface	(NATSUR)	1 : Mud 2 : Clay 3 : Silt 4 : Sand 5 : Stone 6 : Gravel 7 : Pebbles 8 : Cobbles 9 : Rock 11 : Lava 14 : Coral 17 : Shells 18 : Boulder	EN	0, 1
UN Location Code	(unlocd)		TE	0, 1
Class of Dangerous Cargo	(clsdng)	1 : One Blue Light / Cone 2 : Two Blue Lights / Cones 3 : Three Blue Lights / Cones 4 : No Blue Light / Cone 5 : One Red Light / Red Cone Top Down	EN	0, 1
Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs	(S) EN	0, 1

		12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data		
.....Source	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Component	Anchorage Or Berth Aggregation (see clause 25.18)	Anchorage Area, Berth, Mooring Area	Aggregation	0,*
The Collection	Anchorage Or Berth Aggregation (see clause 25.18)	Berth, Bollard, Bunker Station, Communication Area, Mooring Area, Mooring Buoy, Notice Mark, Pile, Refuse Dump, Restricted Area, Shoreline Construction, Terminal, Vehicle Transfer	Aggregation	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, NonStandard Working Day, Service Hours, Nautical Information, Time Schedule In General	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

16.5.1 Anchor berths

Where the positions or limits of anchorages, including anchor berths, are defined by a regulatory authority (for example harbour authority) they must be shown on the largest optimum display scale IENC data. They may also be shown on other optimum display scale data where useful, for example, for planning purposes.

If it is required to encode an anchor berth, it must be done using the feature **Anchor Berth**.

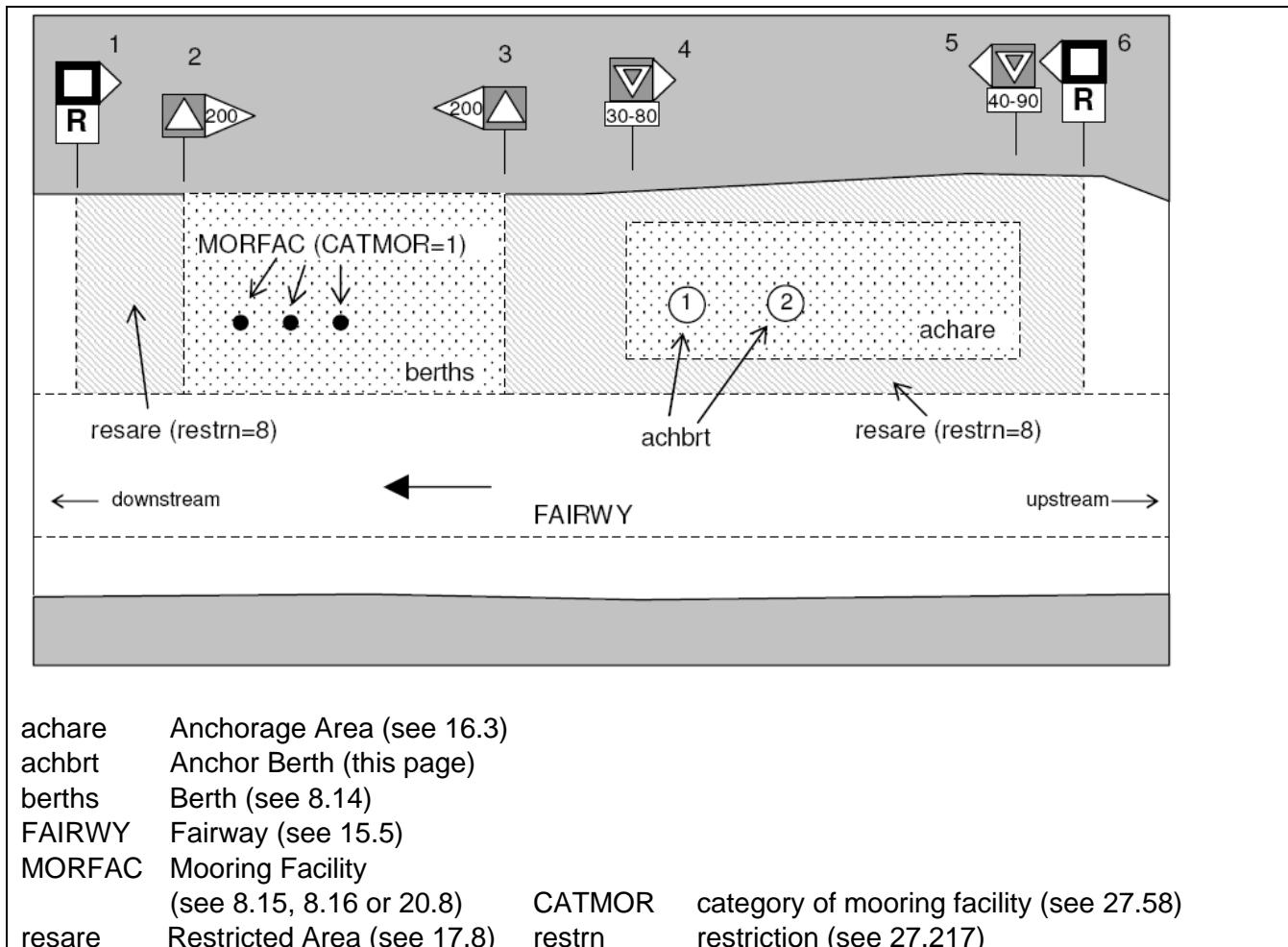
Remarks:

- The complex attribute **feature name**, sub-attribute **name** is used to encode the name and/or number of the **Anchor Berth**. If a group of anchor berths is known by a single common name, the name should be encoded using a **Sea Area/Named Water Area** feature (see clause 9.1) covering the area of the anchor berths.
- The complex attribute **information** (see clause 2.4.6) may be used to provide additional information about the category of anchorage, where required.
- If an anchor berth is defined by a centre point and a swinging circle, it should be of type point, with the radius of the swinging circle encoded using the attribute **radius**.

Distinction: Anchorage Area; Berth; Mooring Area.

Inland specific Encoding Instructions:

- A) Where an anchor berth may only be used for a limited period the duration should be indicated in **information** (INFORM). If there is a time schedule referring to special dates or times, use **Time Schedule – In General** (tisdge) (see 24.6).
- B) If the width of an **Anchor Berth** (achbrt) is not defined by **Notice Marks**, it should be 110' / 33,55 m (approximately three barge widths).
- C) If a structured external XML-file with more detailed communication information is available, the reference to the file has to be entered in the **file reference** (TXTDSC) attribute.
- D) EUR: The linear extent of an **Anchor Berth** (achbrt) feature is defined by markers or **Notice Marks** (signs E.5 – E.5.15 or E.6) on the bank.
- E) The class of dangerous goods in accordance with ADN and the applicable police regulations: 1 (one blue light/cone, signs E.5.5, E.5.9, E.5.13), 2 (two blue lights/cones, signs E.5.6, E.5.10, E.5.14), 3 (three blue lights/cones, signs E.5.7, E.5.11, E.5.15), 4 (no blue lights/cones, signs E.5.4, E.5.8, E.5.12). Dangerous goods in accordance with inland waterway regulations of the Russian Federation: 5 (one red light / cone top down).
- F) EUR: If the ISRS Location Code is available, it has to be encoded (refer to 2.4.13). If a maritime MRN or RIS-ID is available, the attribute **interoperability identifier** must be encoded (refer to **Fehler! Verweisquelle konnte nicht gefunden werden.**).
- G) EUR: **Anchor Berths** must be encoded.
- H) EUR: If the authority has extended the application of the prohibition of anchoring to the use of telescopic piles (spuds), **restriction** (RESTRN) =38 (use of spuds prohibited) must be encoded.



16.6 Seaplane landing area

IHO Definition: SEAPLANE LANDING AREA. A designated portion of water for the landing and take-off of seaplanes. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.152, November 2000).				
S-401 Geo Feature: Seaplane Landing Area (SPLARE) (M)				
Primitives: Point, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>		<i>Inland ECDIS or ECS Symbol</i>	
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
interoperability identifier		MRN (see clause 27.161)	URN	0,1
periodic date range		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 7 : entry prohibited 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 15 : construction prohibited 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transhipment (lightening) prohibited 24 : dragging prohibited	EN	0,*

		25 : stopping prohibited 27 : speed restricted 28 : Overtaking Prohibited 29 : Overtaking of Convoys by Convoys Prohibited 30 : Passing or Overtaking Prohibited 31 : Berthing Prohibited 32 : Berthing Restricted 33 : Making Fast Prohibited 34 : Making Fast Restricted 35 : Turning Prohibited 36 : Restricted Fairway Depth 37 : Restricted Fairway Width 38 : Use of Spuds Prohibited 39 : swimming prohibited 40 : SOx Emission Restricted 41 : NOx Emission Restricted 43 : Passing or Overtaking of Convoys by Convoys Prohibited		
status	(STATUS)	1 : permanent 2 : occasional 3 : recommended 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 9 : mandatory 14 : public	EN	0,*
<i>vessel speed limit</i>			C	0,*
speed limit			(S) RE	1,1
speed units		2 : kilometres per hour 3 : miles per hour 4 : knots	(S) EN	1,1
vessel class			(S) TE	0,1
scale minimum	(SCAMIN)	[45000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(/INFORM) (/NINFORM)		(S) TE	0,1 †
Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police	(S) EN	0, 1

		4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, NonStandard Working Day, Service Hours, Nautical Information, Time Schedule In General	Association	0,+
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

16.6.1 Seaplane landing areas

If it is required to encode a seaplane landing area, it must be done using the feature **Seaplane Landing Area**.

Remarks:

- For additional guidance regarding the encoding of vessel speed limits, see clause 17.4.
- If it is required to encode an area where seaplanes draw water for fire fighting activities, this must be done using **Seaplane Landing Area**.
- If it is required to encode an anchorage for seaplanes, it must be done using an **Anchorage Area** feature (see clause 16.3), with attribute **category of anchorage** = 6 (seaplane anchorage).

Distinction: Airport/Airfield; Helipad; Runway.

Inland specific Encoding Instructions:

16.7 Dumping ground

IHO Definition: **DUMPING GROUND.** A sea area where dredged material or other potentially more harmful material, for example explosives, chemical waste, is deliberately deposited. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.59, November 2000).

S-401 Geo Feature: Dumping Ground (DMPGRD) (C)

Primitives: Point, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of dumping ground	(CATDPG)	2 : chemical waste dumping ground 3 : nuclear waste dumping ground 4 : explosives dumping ground 5 : spoil ground 6 : vessel dumping	EN	1,*
<i>date disused</i>			TD	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 7 : entry prohibited 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted	EN	0,*

		20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transhipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 27 : speed restricted		
<i>status</i>	(STATUS)	1 : permanent 2 : occasional 4 : not in use 6 : reserved 7 : temporary	EN	0,*
<i>vessel speed limit</i>			C	0,*
<i>speed limit</i>			(S) RE	1,1
<i>speed units</i>		2 : kilometres per hour 3 : miles per hour 4 : knots	(S) EN	1,1
<i>vessel class</i>			(S) TE	0,1
<i>scale minimum</i>	(SCAMIN)	[EUR: 26000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
<i>file locator</i>			(S) TE	0,1
<i>file reference</i>	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
<i>headline</i>			(S) TE	0,1
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>text</i>	(INFORM) (NINFORM)		(S) TE	0,1 [†]
<i>Reported Date</i>	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
<i>Source Indication</i>			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
<i>.....Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed	(S) EN	0, 1

		8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data		
.....Source	(SORIND)		(S) TE	1,*
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

† Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

16.7.1 Dumping grounds

Materials deliberately dumped at sea in specified areas (other than those associated with reclamation works) may be classified, according to their significance to the boatmaster, as follows:

- Materials which are generally dispersed before reaching the seabed, for example sewage sludge, are of little navigational significance and no charting action is usually required.
- Spoil from dredging operations or other works which might reduce charted depths significantly in the designated spoil ground.
- Harmful materials, including explosives and chemicals, which are likely to remain concentrated on the seabed.

Dumping of harmful materials is unlikely to affect depths substantially and such dumping grounds are encoded primarily as a warning against anchoring, trawling or other submarine operations.

If it is required to encode a dumping ground, it must be done using the feature **Dumping Ground**.

Remarks:

- A **Dumping Ground** feature of type surface must be covered by features from Skin of the Earth as appropriate (**Depth Area** or **Unsurveyed Area**).
- Disused dumping grounds for harmful materials are considered dangerous for an indefinite period and must therefore be encoded on the largest optimum display scale IENC datasets, with attribute

status = 4 (not in use). The date when the area ceased to be used may be populated using the attribute **date disused**, if known.

- For additional guidance regarding the encoding of vessel speed limits, see clause 17.4.

16.7.2 Spoil grounds, dredging areas

Spoil grounds are areas set aside, clear of shipping channels and in deep water where possible, for the disposal of material (spoil) generally obtained by dredging. Their significance to the boatmaster is that very large quantities of material may be dumped, decreasing the depth of water available. Where possible, charts should be updated in a timely manner so as to include the latest survey information covering the spoil ground.

Extraction (or dredging) areas are those areas where a concentration of dredging vessels may be encountered, taking up sand or shingle to be brought ashore (for example for construction purposes). Their significance is primarily as a collision hazard, although they also indicate the likelihood of finding a greater depth of water than charted. Channels dredged to provide an adequate depth of water for navigation are “dredged areas”, not to be confused with “dredging areas”.

If it is required to encode a spoil ground, it must be done using a **Dumping Ground** feature, with attribute **category of dumping ground = 5** (spoil ground).

If it is required to encode a dredging area where dredging takes place, it must be done using a **Restricted Area** feature (see clause 17.8), with attribute **category of restricted area = 21** (dredging area). An area in which seabed material (for example sand, shingle) is being extracted for purposes such as construction must be encoded, where required, using the feature **Offshore Production Area** (see clause 14.6), with attribute **category of production area = 13** (seabed material extraction area).

Remarks:

- Within a spoil ground; if the depths within the area are liable to be very much less than charted after the discharge of spoil and post-dumping surveys are not available, they may be treated as unsurveyed areas (see clause 11.8), in which case soundings and depth contours may be omitted from the area. Alternatively, an indication of the discrepancy between charted depth information and the actual depths within the spoil ground may be provided by downgrading the information included in the underlying **Quality of Bathymetric Data** feature (see clause 3.8).

Distinction: Dredged Area.

Inland specific Encoding Instructions:

- A) Use **restriction** (RESTRN) if any of the conditions apply.
- B) Dumping grounds in navigable waters shall be encoded if any one of the listed restrictions applies.

16.8 Military practice area

IHO Definition: **MILITARY PRACTICE AREA.** An area within which naval, military or aerial exercises are carried out. (Adapted from IHO Dictionary – S-32).

S-401 Geo Feature: Military Practice Area (MIPARE) (O)

Primitives: Point, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
				
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of military practice area	(CATMPA)	2 : torpedo exercise area 3 : submarine exercise area 4 : firing danger area 5 : mine-laying practice area 6 : small arms firing range	EN	0,*
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
interoperability identifier		MRN (see clause 27.161)	URN	0,1
nationality	(NATION)		TE	0,1
periodic date range		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 7 : entry prohibited 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 15 : construction prohibited	EN	0,*

		16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transhipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 26 : landing prohibited 27 : speed restricted 39 : swimming prohibited		
status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 16 : watched 17 : unwatched	EN	0,*
<i>vessel speed limit</i>			C	0,*
speed limit			(S) RE	1,1
speed units		2 : kilometres per hour 3 : miles per hour 4 : knots	(S) EN	1,1
vessel class			(S) TE	0,1
scale minimum	(SCAMIN)	[EUR: 260000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 [†]
Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military	(S) EN	0, 1

		10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

16.8.1 Military practice areas

Military practice (or exercise) areas at sea are of various types and may be classified as follows with regard to their significance for the boatmaster:

- Firing danger areas, sometimes called firing practice areas; that is, permanent or temporary ranges, including bombing, torpedo and missile ranges.
- Mine-laying practice (and counter-measures) areas.
- Submarine exercise areas.
- Other exercise areas.

Some degree of restriction on navigation and other rights may be implied by the encoding of military practice areas. There may be varying interpretations of the validity of the restrictions and possible infringement of the rights of innocent passage through territorial waters and elsewhere. Where it is thought desirable to depict such areas, even though clear range procedure may be observed, or the areas appear to be a derogation of the freedom of the seas, boatmasters should be informed (not necessarily on IENCs) that publication of the details of a law or regulation is solely for the safety and convenience of shipping and implies no recognition of the international validity of the law or regulation. By this means infringements are not condoned but the boatmaster receives a warning which may be necessary for their safety.

If it is required to encode a military practice area, it must be done using the feature **Military Practice Area**.

Remarks:

- For additional guidance regarding the encoding of vessel speed limits, see clause 17.4.
- Submarine exercise areas should generally not be encoded where submarines exercise over wide areas which it would not be practicable to depict, and over which cautions (to keep a good look out for them) are unlikely to be effective. They may, however, be encoded where they occur in or near major shipping lanes or port approaches.
- Firing danger areas at sea are frequently marked by IALA special buoys sometimes laid around the perimeter of the area and/or by specially erected lights, beacons and targets. If required, all such features which could assist the boatmaster in identifying their position, or could be a hazard, must be encoded in the normal way,
- The existence of mine laying (and counter-measures/clearance) practice areas implies the possibility of unexploded mines or depth charges on the seafloor, and also the presence of harmless practice mines.

Distinction: Caution Area; Restricted Area.

Inland specific Encoding Instructions:

16.9 Administration area

IHO Definition: **ADMINISTRATION AREA.** A defined area within which a jurisdiction applies. It may or may not be named.

For IENCs a defined and named administrative area (e.g. country, state, district) or a defined and named administrative area of a river surveillance

S-401 Geo Feature: Administration Area (ADMARE) (O)

Primitives: Curve, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
<i>in dispute</i>			BO	0,1
jurisdiction	(JRSDTN)	1 : international 2 : national 3 : national sub-division	EN	1,1
feature name		See clause 2.5.8	C	1,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
nationality	(NATION)		TE	1,*
scale minimum	(SCAMIN)	[90000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
<i>pictorial representation</i>	(PICREP)	See clause 2.4.12.2	TE	0,1
Reported Date	(SORDAT)		TD	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1

<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*
[†] Complex attribute feature name , sub-attribute name usage is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.				
For each instance of information , at least one of the sub-attributes file reference or text must be populated.				

16.9.1 International and national territories

International maritime boundaries are those which have been established by agreement between adjacent or opposite States. Boundaries are sometimes negotiated on the basis of the equidistance or "median" line principle. For various reasons, however, agreed boundaries even when negotiated on this principle are seldom true median lines.

Navigationally, international boundaries may vary in their significance over different parts of their lengths.

Inshore, they may represent the delimitation of Territorial Seas of two states or "internal waters", (for example within bay closing lines or straight baseline systems). Offshore, they may represent Exclusive Economic Zone and/or Continental Shelf boundaries.

If it is required to encode a named international or national territory, it must be done using the feature **Administration Area**.

Remarks:

- International land boundaries should be encoded, at least in the vicinity of coasts.
- **Administration Area** must only be encoded using the geometric primitive curve where the real-world instance is actually linear, and it is therefore not possible to encode the feature using the geometric primitive surface. See clause 16.2.

Distinction: Fishery Zone; Land Region; Vessel Traffic Service Area.

Inland specific Encoding Instructions:

- A) Use **Administration Area** (ADMARE) feature, if the information about the applicable jurisdiction or the competent river surveillance is important for navigation.
- B) The nationality is encoded by a 2 character-code following ISO 3166 (Refer to Annex A to S-57 Appendix A)
- C) If a structured external XML-file with detailed communication information is available, the reference to the file has to be entered in **file reference** (TXTDSC). Otherwise communication information can be provided in **information** (INFORM).

16.10 Cargo transhipment area

IHO Definition: **CARGO TRANSHIPMENT AREA.** An area designated for the transfer of cargo from one vessel to another sometimes in order to reduce a vessel's draught. (IHO Dictionary – S-32).

S-401 Geo Feature: Cargo Transhipment Area (CTSARE) (O)

Primitives: Point, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol			
	 <i>Cargo Transhipment Area</i>				
S-401 Attribute		S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
feature name			See clause 2.5.8	C	0,*
language			ISO 639-2/T	(S) TE	1,1
name		(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage			1 : default name display 2 : alternate name display	(S) EN	0,1 †
fixed date range			See clause 2.4.8	C	0,1
date end		(DATEND)		(S) TD	0,1 †
date start		(DATSTA)		(S) TD	0,1 †
interoperability identifier			MRN (see clause 27.161)	URN	0,1
periodic date range			See clause 2.4.8	C	0,*
date end		(PEREND)		(S) TD	1,1
date start		(PERSTA)		(S) TD	1,1
restriction		(RESTRN)	2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 15 : construction prohibited 16 : discharging prohibited 17 : discharging restricted	EN	0,*

		18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 24 : dragging prohibited 27 : speed restricted 28 : Overtaking Prohibited 29 : Overtaking of Convoys by Convoys Prohibited 30 : Passing or Overtaking Prohibited 31 : Berthing Prohibited 32 : Berthing Restricted 33 : Making Fast Prohibited 34 : Making Fast Restricted 35 : Turning Prohibited 36 : Restricted Fairway Depth 37 : Restricted Fairway Width 38 : Use of Spuds Prohibited 39 : swimming prohibited 40 : SOx Emission Restricted 41 : NOx Emission Restricted 43 : Passing or Overtaking of Convoys by Convoys Prohibited		
status	(STATUS)	1 : permanent 2 : occasional 3 : recommended 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 9 : mandatory	EN	0,*
<i>vessel speed limit</i>			C	0,*
speed limit			(S) RE	1,1
speed units		2 : kilometres per hour 3 : miles per hour 4 : knots	(S) EN	1,1
vessel class			(S) TE	0,1
scale minimum	(SCAMIN)	[45000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †

Reported Date	(SORDAT)		TD	0, 1
Pictorial Representation	(PICREP)		TE	0, 1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*

-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*
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[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

16.10.1 Cargo transhipment areas

Areas generally outside port limits may be specifically designated as suitable for the transhipment of oil or other materials from large ships to smaller vessels. The areas selected are relatively sheltered locations and lie off main shipping routes. As the purpose of transhipment is usually to reduce the draught of the larger vessel to allow it to proceed to port, the operation is often known as "lightening" and the areas may be known as "lightening areas" or "cargo transfer areas".

If it is required to encode a cargo transhipment area, it must be done using the feature **Cargo Transhipment Area**.

Remarks:

- For additional guidance regarding the encoding of vessel speed limits, see clause 17.4.
- The encoding of cargo transhipment areas should be adequate to warn other vessels of the likelihood of encountering ships restricted in their ability to manoeuvre. Regulations governing the use of such areas should be encoded using the attribute **restriction** or the complex attribute **information** (see clause 2.4.6).

Distinction: Dock Area; Harbour Area (Administrative); Harbour Facility.

Inland specific Encoding Instructions:

- A The feature **Cargo Transhipment Area** (CTSARE) should only be used to distinguish transhipment anchorage areas and anchorage berths from anchorage areas and anchorage berths without transhipment. For berths see 8.14.
- B) When encoding a transhipment anchorage area or anchorage berth also the **Anchorage Area** (see 16.3) or **Anchor Berth** (see 16.5) must be encoded.
- C) The feature can be used for all types of cargo transhipment areas used for transhipments between maritime vessels or inland vessels (barges) with or without propulsion.

16.11 Caution area

IHO Definition: **CAUTION AREA.** Generally, an area where the mariner has to be made aware of circumstances influencing the safety of navigation. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.33, November 2000).

S-401 Geo Feature: Caution Area (CTNARE) (C)

Primitives: Point, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
<i>condition</i>	(CONDTN)	1 : under construction 3 : under reclamation 5 : planned construction	EN	0,1
<i>fixed date range</i>		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>periodic date range</i>		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
reported date	(SORDAT)	See clause 2.4.8	TD	0,1
<i>status</i>	(STATUS)	5 : periodic/intermittent 7 : temporary	EN	0,1
scale minimum	(SCAMIN)	[EUR: 22000, US: 60000] or see clause 2.5.9	IN	1,1
information	(INFORM)	See clause 2.4.6	C	0,* [†]
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 [†]
<i>pictorial representation</i>	(PICREP)	See clause 2.4.12.2	TE	0,1 [†]

Reported Date	(SORDAT)		TD	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Collection	Notice Mark Aggregation (see clause 0)	Notice Mark	Aggregation	0,*
The Collection	Caution Area Association (see clause 25.4)	Traffic Separation Scheme	Aggregation	0,1
The Auxiliary Feature	Fairway Auxiliary (see clause 25.6)	Fairway	Association	0,*

The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

At least one of the attributes **information** or **pictorial representation** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

16.11.1 Caution areas

If it is required to identify an area in which the boatmaster must be aware of circumstances influencing the safety of navigation (for example an area of continually changing depths), and which cannot be encoded using other feature types, it must be done using the feature **Caution Area**. This feature may be required to identify a danger, a risk, a rule or advice that is not directly related to a particular feature.

Remarks:

- If the information applies to a specific area the **Caution Area** feature should cover only that area.
- If the information to be encoded is spatially linear, this should be encoded using a “very narrow” **Caution Area** feature of type surface (approximately 0,3 mm wide at the optimum display scale of the IENC data).
- Information which may be of use to the boatmaster, but is not significant to safe navigation and cannot be encoded using other feature types, should be encoded using an **Information Area** feature (see clause 16.12). This encoding is intended to reduce the number of alarms or indications generated in the Inland ECDIS or ECS due to the overuse of **Caution Area** features.
- Notes should be kept to a minimum and be as concise as is compatible with accuracy and intelligibility. Hydrographic terminology (jargon) should be avoided, giving preference to easily understood words, for example “depths” rather than “bathymetry”.
- In order to ensure correct Inland ECDIS or ECS display, **Caution Area** features of type surface should not share the geometry of features such as **Depth Contour** and other features with higher Inland ECDIS or ECS display priorities (that is, higher than display priority 3), as the **Caution Area** will appear to be “open ended”, which may confuse the boatmaster. Where this occurs, the edge of the **Caution Area** should be extended outward to clear the “shared” edge, sufficient to avoid “duplicate geometry” validation errors (that is, at least 0.3mm at the optimum display scale for the IENC data).

Distinction: Collision Regulations Limit; Information Area; Obstruction; Underwater/Awash Rock; Unsurveyed Area; Wreck.

Inland specific Encoding Instructions:

- A To be used on a limited basis only for short sections and in case of real importance for safety of navigation.
- B) Areas signposted by notice marks (areas for water scooters, high speed motorboats and slipping of boats) the feature **Caution Area** (CTNARE) shall also be used. Refer to the list of notice marks in the annex.

- C) Names of the sections shall be those, that are generally known by the boatmasters. In case no specific name is known the name of the closest town or land region should be used.
- D) A short description of the impact on the boatmaster should be provided in **information text** (INFORM).
- E) Cliff/natural rock wall:
 - i US: Use **Caution Area** (CTNARE) to buffer between waterline into depth area. **Caution Area** (CTNARE) should be a minimum of 12 m wide.
 - ii US: Encode **Caution Area** (CTNARE) **information text** (INFORM) = Natural Rock Wall
 - iii EUR: If a rock wall is in navigable water and is a hazard to navigation, a **Caution Area** (CTNARE) shall be added.
- F) Swing bridge: US & EUR: Add a **Caution Area** (CTNARE) feature (**information text** (INFORM) = Swing Area) around the swing area that is showing the actual swing area of the swinging bridge span.
- G) Submarine cable: US: Create **Caution Area** (CTNARE) feature buffering the cable 20 metres upstream and downstream of the cable.
- H) Submarine pipelines:
 - i) US: Create **Caution Area** (CTNARE) feature buffering the pipeline 20 metres upstream and downstream of the pipeline
 - ii) US: For water intakes, place point **Pipeline Submarine/On Land** (PIPSOL) feature near intake location if actual pipe (line) location is unknown. Place 20 metre diameter **Caution Area** (CTNARE) around **Pipeline Submarine/On Land** (PIPSOL) (P).
- I) EUR: Water skiing areas marked by main European inland waterway marking system MAIN EUROPEAN INLAND WATERWAY MARKING SYSTEM signs E.17, where navigation is allowed, should be encoded as **Caution Area** (CTNARE), like areas for water bikes or sail boards.

16.12 Information area

IHO Definition: INFORMATION AREA. An area for which general information regarding navigation, but not directly related to safety of navigation, is available.				
S-401 Geo Feature: Information Area (<i>M_NPUB</i>) (O)				
Primitives: Point, Surface				
Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
periodic date range		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
reported date	(SORDAT)	See clause 2.4.8	TD	0,1
scale minimum	(SCAMIN)	[EUR: 45000, US: 60000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,* †
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
<i>pictorial representation</i>	(PICREP)	See clause 2.4.12.2	TE	0,1 †
Source Indication			C	0, 1

<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 †
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*
† Complex attribute feature name , sub-attribute name usage is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.				

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

At least one of the attributes **information** or **pictorial representation** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

16.12.1 Information areas

If it is required to encode information which may be of use to the boatmaster, but is not significant to safety of navigation and cannot be encoded using existing features, it must be done using the feature **Information Area**.

Remarks:

- The feature **Information Area** encodes information which the producer determines is relevant to the boatmaster, but does not warrant the triggering of Inland ECDIS or ECS alarms through the encoding of **Caution Area** features.
- If the information applies to a specific area the **Information Area** feature should cover only that area.

Distinction: Caution Area; Collision Regulations Limit; Obstruction; Underwater/Awash Rock; Unsurveyed Area; Wreck.

Inland specific Encoding Instructions:

16.13 Custom zone

IHO Definition: CUSTOM ZONE. The area within which national custom regulations are in force. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.46, November 2000).				
S-401 Geo Feature: Custom Zone (CUSZNE) (O)				
Primitives: Surface				
Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
nationality	(NATION)		TE	1,1
scale minimum	(SCAMIN)	[45000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFOM)		(S) TE	0,1 †
Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed	(S) EN	0, 1

		8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data		
.....Source	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-101 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

16.13.1 Custom Zones

If it is required to encode a custom zone, it must be done using the feature **Custom Zone**.

Custom zones, where details are provided by a regulatory authority, should be encoded on the largest optimum display scale IENC data covering the area.

Remarks:

- No remarks.

Distinction: Checkpoint; Free Port Area.

Inland specific Encoding Instructions:

16.14 Fishery zone

IHO Definition: FISHERY ZONE. The offshore zone in which exclusive fishing rights and management are held by the coastal nation. (IHO Dictionary – S-32).				
S-401 Geo Feature: Fishery Zone (FSHZNE) (O)				
Primitives: Surface				
Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
interoperability identifier		MRN (see clause 27.161)	URN	0,1
nationality	(NATION)		TE	1,1
status	(STATUS)	1 : permanent 5 : periodic/intermittent 6 : reserved 7 : temporary	EN	0,*
scale minimum	(SCAMIN)	[22000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 [†]
Reported Date	(SORDAT)		TD	0, 1
Pictorial Representation	(PICREP)		TE	0, 1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military	(S) EN	0, 1

		10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

† Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

16.14.1 Fishery zones

A fishery zone is an area inside and beyond the Territorial Sea where a coastal State proclaims that it alone may regulate fishing. Where States have permitted others to fish in parts of the area, it may be desirable to encode the area of both the full area and the area of special concessionary rights. In some instances, claims are described as "conservation zones"; for practical purposes these may be classed with fishery zones since their intended function is to institute fishery conservation measures. Most of

the fishery zone claims are limited by fixed distance (200 nautical miles in some cases) from the Territorial Sea baselines.

If it is required to encode a fishery zone, it must be done using the feature **Fishery Zone**.

Remarks:

- An indication of the fishery zone limit (for example 6 mile, 12 mile) may be encoded using the complex attribute **feature name**.

Distinction: Administration Area; Restricted Area.

Inland specific Encoding Instructions:

16.15 Free port area

IHO Definition: FREE PORT AREA. A port where certain import and export duties are waived (unless goods pass into the country) to facilitate reshipment to other countries. (IHO Dictionary – S-32).

S-401 Geo Feature: Free Port Area (FRPARE) (O)

Primitives: Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
interoperability identifier		MRN (see clause 27.161)	URN	0,1
status	(STATUS)	1 : permanent 6 : reserved 8 : private 14 : public	EN	0,*
scale minimum	(SCAMIN)	[90000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
Condition	(CONDTN)	1 : Under Construction 2 : Ruined 3 : Under Reclamation 5 : Planned Construction	EN	0, 1
Reported Date	(SORDAT)		TD	0, 1

<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

16.15.1 Free port areas

If it is required to encode a free port area, it must be done using the feature **Free Port Area**.

Remarks:

- No remarks.

Distinction: Custom Zone; Production/Storage Area.

Inland specific Encoding Instructions:

A If a structured external XML-file with more detailed communication information is available, the reference to the file has to be entered in the **file reference** (TXTDSC) attribute.

16.16 Harbour area (administrative)

IHO Definition: **HARBOUR AREA.** The area over which a harbour authority has jurisdiction. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.80, November 2000).

For IENCs the area of water and land with the works necessary for its formation, protection and maintenance.

S-401 Geo Feature: Harbour Area (Administrative) (hrbare) (C)

Primitives: Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol
		

S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
feature name		See clause 2.5.8	C	1,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
interoperability identifier		MRN (see clause 27.161)	URN	0,1
status	(STATUS)	1 : permanent 4 : not in use 5 : periodic/intermittend 6 : reserved 8 : private 14 : public	EN	0,*
scale minimum	(SCAMIN)	[22000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1

text	(INFORM) (NINFORM)		(S) TE	0,1 †
UN Location Code	(unlocd)		TE	0, 1
Category of Harbour Area	(cathbr)	1 : Custom Harbour 2 : Port of Refuge 3 : Yacht Harbour/Marina 4 : Fishing Harbour 5 : Private Harbour	EN	0, *
Condition	(CONDTN)	1 : Under Construction 2 : Ruined 3 : Under Reclamation 5 : Planned Construction	EN	0, 1
Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
<i>Fixed Date Range</i>			C	0, 1
Date End	(DATEND)		(S) TD	0, 1
Date Start	(DATSTA)		(S) TD	0, 1
<i>Periodic Date Range</i>			C	0, *
Date End	(DATEND)		(S) TD	1, 1
Date Start	(DATSTA)		(S) TD	1, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services	(S) EN	0, 1

		13 : News Media 14 : Traffic Data		
.....Source	(SORIND)		(S) TE	1,*
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

† Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

16.16.1 Administrative harbour areas

Administrative harbour areas must be shown on at least the largest optimum display scale IENC datasets, where possible, to assist boatmasters in complying with harbour regulations.

If it is required to encode an administrative harbour area, it must be done using the feature **Harbour Area (Administrative)**.

Remarks:

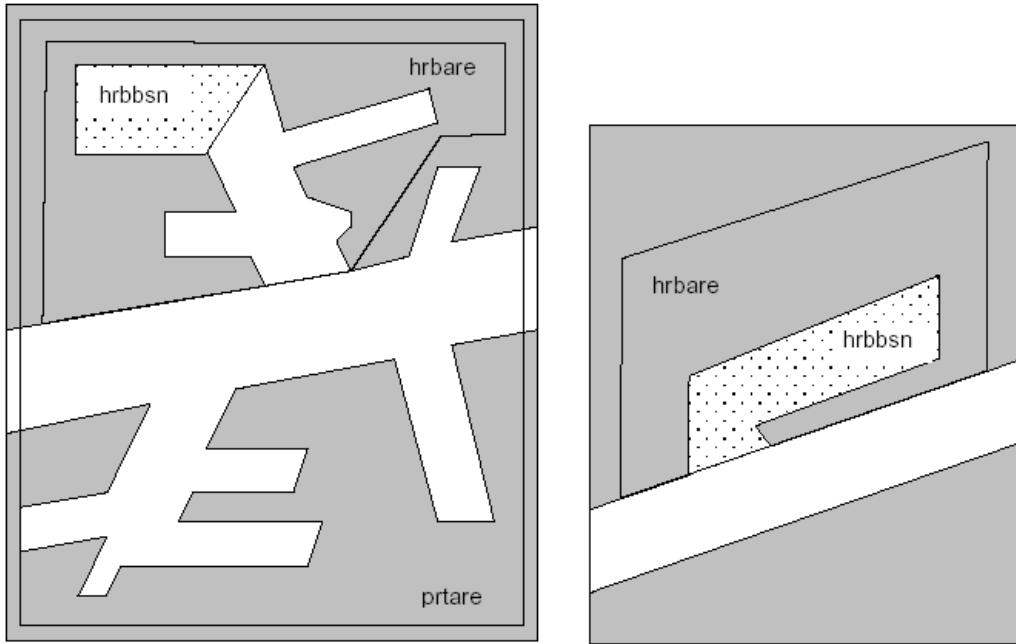
- If it is required to encode a named harbour area over which there is no jurisdictional authority, it must be done using the feature **Sea Area/Named Water Area** (see clause 9.1).
- A masked line may be used to suppress the symbolisation of the boundary, where such symbolisation is considered inappropriate.

Distinction: Dock Area; Sea Area/Named Water Area.

Inland specific Encoding Instructions:

- A) A **Harbour Area** covers the harbour but also the area of land which supplies the harbour installations.
- B) If a structured external XML-file with more detailed communication information is available, the reference to the file has to be entered in the **file reference** (TXTDSC) attribute.
- C) If the ISRS Location Code is available it has to be encoded (refer to 2.4.13). If a maritime MRN or RIS-ID is available, the attribute **interoperability identifier** must be encoded (refer to **Fehler! Verweisquelle konnte nicht gefunden werden.**).

- D) For yacht harbour / marina, see 22.7
- E) EUR: **Harbour Areas** must be encoded.



hrbare Harbour Area (this page)

hrbbsn Harbour Basin (see 8.25)

prtare Port Area (see 8.27)

16.17 Oil barrier

IHO Definition: **OIL BARRIER.** A floating barrier to stop and contain the spread of oil on a water body surface. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010). For IENCs any construction to dam oil flow on water.

S-401 Geo Feature: Oil Barrier (OILBAR) (M)

Primitives: Curve

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of oil barrier	(CATOLB)	1 : oil retention (high pressure pipe) 2 : floating oil barrier	EN	0,1
condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1 [†]
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1
date start	(DATSTA)		(S) TD	0,1
interoperability identifier		MRN (see clause 27.161)	URN	0,1
reported date	(SORDAT)	See clause 2.4.8	TD	0,1
status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private	EN	0,*
scale minimum	(SCAMIN)	[EUR: 8000, US: 12000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1

file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NIINFORM)		(S) TE	0,1 †
Pictorial Representation	(PICREP)		TE	0, 1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*

The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

16.17.1 Oil barriers

If it is required to encode an oil barrier, it must be done using the feature **Oil Barrier**.

Remarks:

- No remarks.

Distinction:

Inland specific Encoding Instructions:

16.18 Straight Territorial Sea Baseline

IHO Definition: STRAIGHT TERRITORIAL SEA BASELINE. Straight baselines are a system of straight lines joining specified or discrete points on the low-water line, usually known as straight baseline turning points. Straight baselines are used in delimitation. (IHO Dictionary – S-32).				
S-401 Geo Feature: Straight Territorial Sea Baseline (STSLNE) (O)				
Primitives: Curve				
Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
interoperability identifier		MRN (see clause 27.161)	URN	0,1
nationality	(NATION)		TE	1,1
scale minimum	(SCAMIN)	[90000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NIINFORM)		(S) TE	0,1 †
Reported Date	(SORDAT)		TD	0, 1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed	(S) EN	0, 1

		9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data		
.....Source	(SORIND)		(S) TE	1,*
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-101 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

16.18.1 Straight Territorial Sea Baselines

A Territorial Sea is delimited by:

- Straight Territorial Sea Baselines;
- International maritime boundaries (see clause 16.1); and

The term “Baseline” refers to the line from which the breadth of the Territorial Sea, are measured. It is also the dividing line between internal waters and territorial seas. Internal waters comprise all areas of the sea on the landward side of the Territorial Sea Baselines, as well as inland waters including rivers, lakes, etc.

The normal baseline is the low water line (which is not defined any more precisely by UNCLOS) of the mainland, islands, or low tide elevations, as depicted on large scale charts officially recognised by the coastal State; they therefore do not require depiction in ENCs. Features which are naturally-formed and dry at low water (for example rocks, reefs, sand banks) may be considered low-tide elevations and included in the baseline (details are given in UNCLOS - see IHO publication C-51).

A straight baseline may be used:

- as a closing line across the mouth or estuary of a river;
- as a closing line across the mouth of a juridical bay or a historical bay;
- as part of a system of Straight Territorial Sea Baselines, for example to connect seaward points on a deeply indented coastline, a coastline that is fringed with islands, around unstable coastlines; or
- as an archipelagic baseline.

If it is required to encode a Straight Territorial Sea Baseline, it must be done using the feature **Straight Territorial Sea Baseline**.

Remarks:

- No remarks.

Distinction:**Inland specific Encoding Instructions:**

16.19 Pilotage district

IHO Definition: **PILOTAGE DISTRICT.** An area within which a pilotage direction exists. Such directions are regulated by a competent harbour authority which dictates circumstances under which they apply. (UK Pilotage Act 1987).

S-401 Geo Feature: Pilotage District (M)

Primitives: Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
communication channel	(COMCHA)		TE	0,*
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(PILDST) (NPLDST)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
scale minimum	(SCAMIN)	[24000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 [†]
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Reported Date	(SORDAT)		TD	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance	(S) EN	0, 1

		15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Collection	Pilotage District Association (see clause 25.8)	Pilot Boarding Place	Aggregation	0,1
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

16.19.1 Pilotage districts

If it is required to encode the area within which regulations regarding pilotage apply it should be done using the feature **Pilotage District**.

Remarks:

- The relevant regulations, where required, must be encoded using the complex attribute **information** (see clause 2.4.6).
- Where the limit of pilotage regulations are coincident with harbour or port limits it is not required to encode a **Pilotage District** feature.

- Each VHF-channel should be indicated, using the attribute **communication channel** (see clause 27.107). Alternately, if the same VHF-channel(s) apply to multiple features in the dataset, this should be indicated through an associated instance of the information type **Contact Details**, attribute **communication channel** (see clause 24.1).
- The relationship between the pilotage district and any associated pilot boarding places should be encoded using the feature association **Pilotage District Association** (see clause 25.8).

Distinction: Pilot Boarding Place.

Inland specific Encoding Instructions:

16.20 Collision regulations limit

IHO Definition: **COLLISION REGULATIONS LIMIT.** Convention on the International Regulations for Preventing Collisions at Sea, 1972 (COLREGs). The demarcation line between inland navigation rules and international navigation rules.

S-401 Geo Feature: Collision Regulations Limit (O)

Primitives: Curve

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
interoperability identifier		MRN (see clause 27.161)	URN	0,1
periodic date range		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
regulation citation			TE	0,1
scale minimum	(SCAMIN)	[90000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
Reported Date	(SORDAT)		TD	0, 1

Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

16.20.1 Collision regulations limit

If it is required to encode a collision regulations (COLREGs) demarcation line, it must be done using the feature **Collision Regulations Limit**.

Remarks:

- If it is required to encode the national regulation citation it must be done using the attribute **regulation citation**. The regulation citation is generally the national legal citation for the implementation of an international regulation (for example 33 CFR 26), as distinct from the title for the regulation, which should be populated in the complex attribute **feature name**, sub-attribute **name** (for example *International Regulations for the Prevention of Collisions at Sea – Vessel Bridge-to-Bridge Radiotelephone Regulations*).

Distinction: Administration Area.

Inland specific Encoding Instructions:

16.21 Maximum Permitted Ship Dimensions

IHO Definition: Waterway or waterway section for which a juridical regulation with respect to the maximum permitted vessel dimensions exists.				
S-401 Geo Feature: Maximum Permitted Ship Dimensions (lg_sdm) (C)				
Super Type:				
Primitives: surface				
Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol	Type	Multiplicity
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Related Issue	(lg_rel)	1 : Other 2 : Usage of Waterway 3 : Carriage of Equipment 4 : Task, Operation	EN	0, 1
Description of Legal Conditions	(lg_des)		TE	0, 1
Category of Ship (Including)	(lc_csi)	1 : All Types 2 : Other 3 : Non-Motorized Vessel 5 : Craft 6 : Vessel 7 : Inland Waterway Vessel 8 : Sea Going Ship 9 : Motor Vessel 10 : Motor Tanker 11 : Motor Cargo Vessel 12 : Canal Barge 13 : Tug 14 : Pusher 15 : Barge 16 : Tank Barge 17 : Dumb Barge 18 : Lighter 19 : Tank Lighter 20 : Cargo Lighter 21 : Ship Borne Lighter 22 : Passenger Vessel 23 : Passenger Sailing Vessel 24 : Day Trip Vessel 25 : Cabin Vessel 26 : High-Speed Vessel 27 : Floating Equipment 28 : Worksite Craft 29 : Recreational Craft 30 : Dinghy 31 : Floating Establishment 32 : Floating Object	EN	0, *
Category of Ship (Excluding)	(lc_cse)	1 : All Types 2 : Other 3 : Non-Motorized Vessel 5 : Craft 6 : Vessel 7 : Inland Waterway Vessel 8 : Sea Going Ship 9 : Motor Vessel 10 : Motor Tanker	EN	0, *

		11 : Motor Cargo Vessel 12 : Canal Barge 13 : Tug 14 : Pusher 15 : Barge 16 : Tank Barge 17 : Dumb Barge 18 : Lighter 19 : Tank Lighter 20 : Cargo Lighter 21 : Ship Borne Lighter 22 : Passenger Vessel 23 : Passenger Sailing Vessel 24 : Day Trip Vessel 25 : Cabin Vessel 26 : High-Speed Vessel 27 : Floating Equipment 28 : Worksite Craft 29 : Recreational Craft 30 : Dinghy 31 : Floating Establishment 32 : Floating Object		
Assemblies of Ship (Including)	(lc_asi)	1 : All Types 2 : Other 3 : Single Vessel 5 : Convoy 6 : Formation 7 : Rigid Convoy 8 : Pushed Convoy 9 : Breastested Up Formation 10 : Towed Convoy	EN	0, *
Assemblies of Ship (Excluding)	(lc_ase)	1 : All Types 2 : Other 3 : Single Vessel 5 : Convoy 6 : Formation 7 : Rigid Convoy 8 : Pushed Convoy 9 : Breastested Up Formation 10 : Towed Convoy	EN	0, *
Category of Cargo (Including)	(lc_cci)	1 : All Types 2 : Other 4 : Bulk 5 : Dry Cargo 6 : Liquid Cargo 7 : Liquid Cargo (Type N) 8 : Liquid Cargo (Type C) 9 : Gas	EN	0, *
Category of Cargo (Excluding)	(lc_cce)	1 : All Types 2 : Other 4 : Bulk 5 : Dry Cargo 6 : Liquid Cargo 7 : Liquid Cargo (Type N) 8 : Liquid Cargo (Type C) 9 : Gas	EN	0, *
Maximal Permitted Beam	(lg_bme)	[xx.xx] (metres), e.g., 10.45	RE	0, 1
Maximal Permitted Length	(lg_lgs)	[xxx.xx] (metres), e.g., 110.00	RE	0, 1
Maximal Permitted Draught	(lg_drt)	[xx.xx] (metres), e.g., 3.10	RE	0, 1
Maximal Permitted Water Displacement	(lg_wdp)	[xxxx.x] (m³ or tonnes), e.g., 310.0	RE	0, 1

Water Displacement Unit	(lg_wdu)	1 : Other 2 : Cubic Metres 3 : Tonnes	EN	0, 1
<i>Fixed Date Range</i>			C	0, 1
Date End	(DATEND)		(S) TD	0, 1
Date Start	(DATSTA)		(S) TD	0, 1
<i>Periodic Date Range</i>			C	0, *
Date End	(DATEND)		(S) TD	1, 1
Date Start	(DATSTA)		(S) TD	1, 1
Reported Date	(SORDAT)		TD	0, 1
Publication Reference	(lg_pbr)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0, *
<i>language</i>		ISO 639-2/T	(S) TE	1, 1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1, 1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0, 1 †
Feature Associations				

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.17)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Spatial Association (see clause 25.11)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

Inland specific encoding instructions:

- A) The actual value for ship dimension limits are encoded by the respective regulation attributes (**maximal permitted beam** (lg_bme), **maximal permitted length** (lg_lgs), **maximal permitted draught** (lg_drt), **maximal permitted water displacement** (lg_wdp)).
- B) If **maximal permitted water displacement** (lg_wdp) is encoded the unit for the water displacement must be given as well.
- C) Use **related issue** (lg_rel) to indicate if the particular regulation is meant to control the general usage of the waterway, the carriage of equipment, tasks/operations performed by the boatmaster or other instructions.
- D) Condition attributes (**category of ship (including)** (lc_csi); **category of ship (excluding)** (lc_cse); **assemblies of ship (including)** (lc_asi); **assemblies of ship (excluding)** (lc_ase); **category of cargo (including)** (lc_cci); **category of cargo (excluding)** (lc_cce)) must be used to describe the conditions under which a particular law / regulation is applicable.
- E) To describe the categories for ship types, ship formations and cargo type use either implicit or explicit type selection.
- F) If the value 2 'other' is used for one of the above category attributes the description attribute **realted issue** (lg_des) must be used to describe the details or indicate where detailed information can be found.
- G) EUR: Must be encoded if a regulation for (a stretch of) a waterway with regard to maximum permitted ship dimensions exists unless a CEMT class has been encoded by a **Waterway Area** (wtware) feature (15.23 CEMT Classification) and the permitted ship dimensions are equal to the CEMT class.

16.22 Maximum Permitted Vessel Speed

IHO Definition: Waterway or waterway section for which a juridical regulation with respect to the maximum permitted vessel speed exists.				
S-401 Geo Feature: Maximum Permitted Vessel Speed (lg_vsp) (C)				
Super Type:				
Primitives: surface				
Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol	Type	Multiplicity
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Related Issue	(lg_rel)	1 : Other 2 : Usage of Waterway 3 : Carriage of Equipment 4 : Task, Operation	EN	0, 1
Description of Legal Conditions	(lg_des)		TE	0, 1
Category of Ship (Including)	(lc_csi)	1 : All Types 2 : Other 3 : Non-Motorized Vessel 5 : Craft 6 : Vessel 7 : Inland Waterway Vessel 8 : Sea Going Ship 9 : Motor Vessel 10 : Motor Tanker 11 : Motor Cargo Vessel 12 : Canal Barge 13 : Tug 14 : Pusher 15 : Barge 16 : Tank Barge 17 : Dumb Barge 18 : Lighter 19 : Tank Lighter 20 : Cargo Lighter 21 : Ship Borne Lighter 22 : Passenger Vessel 23 : Passenger Sailing Vessel 24 : Day Trip Vessel 25 : Cabin Vessel 26 : High-Speed Vessel 27 : Floating Equipment 28 : Worksite Craft 29 : Recreational Craft 30 : Dinghy 31 : Floating Establishment 32 : Floating Object	EN	0, *
Category of Ship (Excluding)	(lc_cse)	1 : All Types 2 : Other 3 : Non-Motorized Vessel 5 : Craft 6 : Vessel 7 : Inland Waterway Vessel 8 : Sea Going Ship 9 : Motor Vessel 10 : Motor Tanker	EN	0, *

		11 : Motor Cargo Vessel 12 : Canal Barge 13 : Tug 14 : Pusher 15 : Barge 16 : Tank Barge 17 : Dumb Barge 18 : Lighter 19 : Tank Lighter 20 : Cargo Lighter 21 : Ship Borne Lighter 22 : Passenger Vessel 23 : Passenger Sailing Vessel 24 : Day Trip Vessel 25 : Cabin Vessel 26 : High-Speed Vessel 27 : Floating Equipment 28 : Worksite Craft 29 : Recreational Craft 30 : Dinghy 31 : Floating Establishment 32 : Floating Object		
Assemblies of Ship (Including)	(lc_asi)	1 : All Types 2 : Other 3 : Single Vessel 5 : Convoy 6 : Formation 7 : Rigid Convoy 8 : Pushed Convoy 9 : Breastested Up Formation 10 : Towed Convoy	EN	0, *
Assemblies of Ship (Excluding)	(lc_ase)	1 : All Types 2 : Other 3 : Single Vessel 5 : Convoy 6 : Formation 7 : Rigid Convoy 8 : Pushed Convoy 9 : Breastested Up Formation 10 : Towed Convoy	EN	0, *
Category of Cargo (Including)	(lc_cci)	1 : All Types 2 : Other 4 : Bulk 5 : Dry Cargo 6 : Liquid Cargo 7 : Liquid Cargo (Type N) 8 : Liquid Cargo (Type C) 9 : Gas	EN	0, *
Category of Cargo (Excluding)	(lc_cce)	1 : All Types 2 : Other 4 : Bulk 5 : Dry Cargo 6 : Liquid Cargo 7 : Liquid Cargo (Type N) 8 : Liquid Cargo (Type C) 9 : Gas	EN	0, *
Maximal Permitted Speed	(lg_spd)	[xx.x] (km/h), e.g., 10.0 for a maximum permitted speed of 10.0 km/h	RE	0, 1
Speed Reference	(lg_spr)	1 : Other 2 : Speed Over Ground 3 : Speed Through Water	EN	0, 1
<i>Fixed Date Range</i>			C	0, 1

Date End	(DATEND)		(S) TD	0, 1
Date Start	(DATSTA)		(S) TD	0, 1
<i>Periodic Date Range</i>			C	0, *
Date End	(DATEND)		(S) TD	1, 1
Date Start	(DATSTA)		(S) TD	1, 1
Reported Date	(SORDAT)		TD	0, 1
Publication Reference	(lg_pbr)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
<i>.....Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
<i>.....Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0, *
<i>language</i>		ISO 639-2/T	(S) TE	1, 1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1, 1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0, 1 †
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.17)	Update Information	Association	0, *

The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Spatial Association (see clause 25.11)	Spatial Quality	Association	0,*
† Complex attribute feature name , sub-attribute name usage is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.				
<u>Inland specific encoding instructions:</u>				
<p>A) The actual value for the speed limit is encoded by the respective regulation attribute maximal permitted speed (lg_spd).</p> <p>B) The reference of the given speed value (e.g., speed over ground, speed through water) must be encoded by means of speed reference (lg_spr).</p> <p>C) Use related issue (lg_rel)' to indicate if the particular regulation is meant to control the general usage of the waterway, the carriage of equipment, tasks/operations performed by the boatmaster or other instructions.</p> <p>D) Condition attributes (category of ship (including) (lc_csi); category of ship (excluding) (lc_cse); assemblies of ship (including) (lc_asi); assemblies of ship (excluding) (lc_ase); category of cargo (including) (lc_cci); category of cargo (excluding) (lc_cce)) .must be used to describe the conditions under which a particular law / regulation is applicable.</p> <p>E) To describe the categories for ship types, ship formations and cargo type use either implicit or explicit type selection.</p> <p>F) If the value 2 'other' is used for one of the above category attributes the description attribute related issue (lg_des) must be used to describe the details or indicate where detailed information can be found.</p> <p>G) EUR: Must be encoded if a regulation for (a stretch of) a waterway with regard to maximum permitted vessel speed exists.</p>				

17 Geo Features – Restricted Areas – Overview

There are many types of areas within which certain activities are discouraged or prohibited, or from which certain classes of vessels are excluded. The general term for all areas in which certain aspects of navigation may be restricted or prohibited by regulations is “Restricted Area”, or equivalent. The word “prohibited”, or its equivalent, may appear in terms relating to activities which are contrary to the regulations, for example “Anchoring Prohibited”, “Entry Prohibited”.

If it is required to encode a restricted area, it must be done using the feature **Restricted Area** (see clause 17.8); or using other features having the attribute **restriction** (**Anchorage Area**, **Cable Area**, **Cargo Transhipment Area**, **Dumping Ground**, **Dredged Area**, **Fairway**, **Harbour Facility**, **Inshore Traffic Zone**, **Marine Farm/Culture**, **Military Practice Area**, **Offshore Production Area**, **Submarine Pipeline Area**, **Pipeline Submarine/On Land**, **Precautionary Area**, **Seaplane Landing Area**, **Traffic Separation Scheme Crossing**, **Traffic Separation Scheme Lane Part**).

Remarks:

- The attribute **category of restricted area** is used to describe the reason for the regulation, while the attribute **restriction** describes the restrictions.
- The complex attribute **information** (see clause 2.4.6) may be used to provide an additional explanation about the regulation (for example the equivalent to a caution note from a paper chart), where required.
- An area in which regulations apply due to recreation activities such as water skiing, jet skiing, kite surfing and rowing must be encoded, where required, as **Restricted Area** with **category of restricted area** = 32 (recreation area).
- If it is required to encode an area for which the boatmaster must be made aware of circumstances influencing the safety of navigation, it must be done using the feature **Caution Area** (see clause 16.11). This feature may be used to identify a danger, a risk, a rule or advice (for example an area of continually changing depths) which is not directly related to a particular feature.

17.1 Minefields

If it is required to encode a minefield, it must be done using a **Restricted Area** feature (see clause 17.8), with attribute **category of restricted area** = 14 (minefield). Former mined areas should also be encoded with attribute **status** = 4 (not in use).

17.2 Degaussing ranges

A degaussing (or demagnetising) range is an area, usually of about 0.2 M diameter, within which ships' magnetic fields may be measured. Sensing instruments and cables are installed on the seafloor in the range and there are cables leading from the range to a control position ashore. The range is usually marked by distinctive buoys. The significance of a degaussing range to boatmasters is that anchoring and trawling are prohibited and that the range may have to be avoided when vessels are using it.

If it is required to encode a degaussing range, it must be done using a **Restricted Area** feature (see clause 17.8), with attribute **category of restricted area** = 8 (degaussing range).

17.3 Nature reserves

If it is required to encode a marine nature reserve area, it must be done using a **Restricted Area** feature (see clause 17.8), with attribute **category of restricted area** = 4 (nature reserve).

17.4 Speed limits

Speed is often limited inside harbours in order to prevent wakes. If it is required to encode this restriction, it must be done using a **Restricted Area** feature (see clause 17.8), with the attribute **category of restricted area** = 24 (no wake area) or **restriction** = 13 (no wake). If it is required to encode cases where the speed limit is known in general or for a certain class(es) of vessel, it must be done using a **Restricted Area** or using other features having the attribute **restriction** (see clause 17 above) and having **restriction** = 27 (speed restricted), with the speed limit, speed units and, if appropriate, the class of vessel, encoded using an instance of the complex attribute **vessel speed limit**, subattributes **speed limit**, **speed units** and **vessel class**. Further detailed information regarding speed limits, for example varying speed limits based on vessel length, draught or cargo, may be encoded, if required, using the complex attribute **information**; or using the attribute **pictorial representation** (for example, to reproduce the graphic for a speed restriction table contained in a Nautical Publication).

If it is required to encode the buoys/beacons marking the **Restricted Area** feature with speed limits, it must be done using **Special Purpose/General Beacon** or **Special Purpose/General Buoy** features (see clauses 20.13 and 20.5 respectively), with the attribute **category of special purpose mark** = 24 (reduced wake mark) or 25 (speed limit mark). The speed limit and its unit of measurement should be encoded using the complex attribute **information** (see clause 2.4.6), sub-attribute **text** (for example *Speed limit is 6 knots*).

17.5 Anchoring restricted

If it is required to encode a restricted anchoring area, it must be done using a **Restricted Area** feature (see clause 17.8), or using other features with the attribute **restriction** (see clause 17.17), where **restriction** = 1 (anchoring prohibited) or 2 (anchoring restricted). Additional information about the restriction should be encoded using the complex attribute **information** (see clause 2.4.6).

17.6 Areas to be avoided

If it is required to encode an IMO Area to be Avoided, it must be done using a **Restricted Area** feature (see clause 17.8), with attribute **restriction** = 14 (area to be avoided). An IMO Area to be Avoided around a navigational aid must also be encoded with attribute **category of restricted area** = 12 (navigational aid safety zone).

Remarks:

- Areas other than IMO Area to be Avoided for which entry is prohibited or restricted should be encoded using the **Restricted Area**, having values **restriction** = 7 (entry prohibited) or 8 (entry restricted).

17.7 Environmentally Sensitive Sea Areas

Environmentally Sensitive Sea Areas (ESSA) should be included on IENCs where there is a specifically identified requirement, and where it is practicable, given the optimum display scale of the IENC data and the extent of the ESSA. If there is no such requirement, or if it is not practicable, details of ESSA should only be inserted in associated publications, such as Sailing Directions. It should be noted that the inclusion of ESSA on smaller optimum display scale of the IENC data may be appropriate for voyage planning purposes.

If it is required to encode an Environmentally Sensitive Sea Area, it must be done using a **Restricted Area** feature (see clause 17.8), with attribute **category of restricted area = 27** (ESSA) or **28** (PSSA).

An Environmentally Sensitive Sea Area that is shown on the source as a point symbol should be encoded using a small surface restricted area feature.

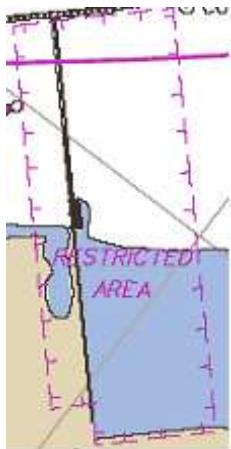
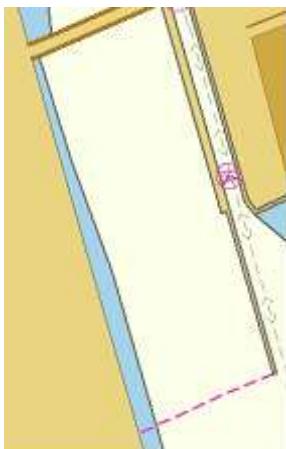
17.8 Restricted area

IHO Definition: **RESTRICTED AREA.** A specified area on land or water designated by an appropriate authority within which access or navigation is restricted in accordance with certain specified conditions. (Adapted from IHO Dictionary – S-32).

For IENCs restricted areas typically surround dams; see 8.12 Dams.

S-401 Geo Feature: Restricted Area (RESARE, resare) (C)

Primitives: Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
				
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of restricted area	(CATREA)	1 : offshore safety zone 4 : nature reserve 5 : bird sanctuary 6 : game reserve 7 : seal sanctuary 8 : degaussing range 9 : military area 10 : historic wreck area 12 : navigational aid safety zone 14 : minefield 18 : swimming area 19 : waiting area 20 : research area 21 : dredging area 22 : fish sanctuary 23 : ecological reserve 24 : no wake area 25 : swinging area 26 : water skiing area 27 : environmentally sensitive sea area 28 : particularly sensitive sea area 29 : disengagement area 30 : port security area 31 : coral sanctuary 32 : recreation area 33 : ship pollution emission control	EN	0,*
feature name		See clause 2.5.8	C	0,*

language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
<i>fixed date range</i>		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>periodic date range</i>		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 7 : entry prohibited 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 14 : area to be avoided 15 : construction prohibited 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historic artefacts prohibited 23 : cargo transhipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 26 : landing prohibited 27 : speed restricted 28 : Overtaking Prohibited 29 : Overtaking of Convoys by Convoys Prohibited 30 : Passing or Overtaking Prohibited 31 : Berthing Prohibited 32 : Berthing Restricted 33 : Making Fast Prohibited 34 : Making Fast Restricted 35 : Turning Prohibited 36 : Restricted Fairway Depth 37 : Restricted Fairway Width	EN	1,*

		38 : Use of Spuds Prohibited 39 : swimming prohibited 40 : SOx Emission Restricted 41 : NOx Emission Restricted 42 : power-driven vessels prohibited 43 : Passing or Overtaking of Convoys by Convoys Prohibited		
<i>status</i>	(STATUS)	1 : permanent 2 : occasional 3 : recommended 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 9 : mandatory 18 : existence doubtful 28 : buoys	EN	0,*
<i>vessel speed limit</i>			C	0,*
speed limit			(S) RE	1,1
speed units		2 : kilometres per hour 3 : miles per hour 4 : knots	(S) EN	1,1
vessel class			(S) TE	0,1
scale minimum	(SCAMIN)	[EUR: 22000, US: 75000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
Category of Temporal Variation	(CATTEV)	4 : Likely to Change 5 : Unlikely to Change 6 : Unassessed	EN	0, 1
Nature of Surface	(NATSUR)	1 : Mud 2 : Clay 3 : Silt 4 : Sand 5 : Stone 6 : Gravel 7 : Pebbles 8 : Cobbles 9 : Rock 11 : Lava 14 : Coral 17 : Shells 18 : Boulder	EN	0, 1

Reported Date	(SORDAT)		TD	0, 1
Pictorial Representation	(PICREP)		TE	0, 1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Collection	Notice Mark Aggregation (see clause 0)	Notice Mark	Aggregation	0,*
The Component	Anchorage Or Berth Aggregation (see clause 25.18)	Anchorage Area, Anchor Berth, Berth, Mooring Area	Association	0,*
The Component	Barrage Association (see clause 0)	Dam	Association	0,*

The Component	Lock Aggregation (see clause 25.23)	Lock Basin	Association	0,*
The Component	Tunnel Aggregation (see clause 25.27)	Tunnel	Association	0,*
The Auxiliary Feature	Fairway Auxiliary (see clause 25.6)	Fairway	Association	0,*
The Component	Traffic Separation Scheme Aggregation (see clause 25.14)	Traffic Separation Scheme	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

17.8.1 Restricted areas

If it is required to encode a restricted area, it must be done using the feature **Restricted Area**, or using other features having the attribute **restriction** (**Anchorage Area**, **Cable Area**, **Dumping Ground**, **Dredged Area**, **Fairway**, **Harbour Facility**, **Inshore Traffic Zone**, **Marine Farm/Culture**, **Military Practice Area**, **Offshore Production Area**, **Submarine Pipeline Area**, **Pipeline Submarine/On Land**, **Precautionary Area**, **Seaplane Landing Area**, **Traffic Separation Scheme Crossing**, **Traffic Separation Scheme Lane Part**).

Remarks:

- If the type of restriction for the area cannot be encoded using the mandatory attribute **restriction** it must be encoded, where required, using the complex attribute **information**, sub-attribute **text**; and **restriction** populated as empty (null).
- For additional guidance regarding the encoding of vessel speed limits, see clause 17.4.
- The term “no anchoring area” is used to identify the IMO routeing measure of that name. Such areas, where required, must be encoded as **Restricted Area** with attribute **restriction = 1** (anchoring prohibited).

Distinction: Anchorage Area; Cable Area; Caution Area; Collision Regulations Limit; Depth Area; Dredged Area; Dumping Ground; Fairway; Information Area; Military Practice Area; Submarine Pipeline Area.

Inland specific Encoding Instructions:

- A Outline restricted area. The shoreline can be part of it, but may not be overlapped.
- B EUR: Restricted areas that are or could be defined by the signs A.1 to A.9, B.6, C.1, C.3, C.5 (see annex AA) shall be encoded.
- C If a restriction is more complicated see 16.21 and 16.22.

- D) The feature should not be used for restrictions that apply to whole waterways or large sections of waterways. For instance, If one restricted area covers a waterway, smaller restricted areas with more important information for the safety of navigation may not be noticed by the user. Especially restricted fairway depth and restricted fairway width should only be used for small areas of up to 1 km.
- E) EUR: **category of restricted area** (CATREA) = 26 (waterskiing area) may only be used, if navigation is not allowed in the area. Water skiing areas marked by signs E.17, where navigation is allowed, should be encoded as **Caution Area** (CTNARE), like areas for water bikes or sail boards.
- F) EUR: If the authority has extended the application of the prohibition of anchoring to the use of telescopic piles (spuds), **restriction** (RESTRN) =38 (use of spuds prohibited) must be encoded.
- G) Where anchoring or using spuds is prohibited, encode **Restricted Area** (RESARE, resare) for sections of a revetment within the waterway.
- H) If appropriate, place **Restricted Area** (RESARE, resare) around dam, extending on both sides of the dam the length of the lock guidewall or the area that is marked by buoys.
- I) Sections of limited depth are generally, short sections of a waterway with limited depth and well known to boatmasters as of high relevance for safety, also by shipping companies as the reference for the planning of the draught of vessels.
- i) To be used on a limited basis only for short sections.
 - ii) Names of the sections shall be those, which are generally known by the boatmasters. In case no specific name is known the name of the closest town or land region should be used.
 - iii) If it is not sure that the bottom of the river is stable, **information text** (INFORM) shall equal, "water depth may change rapidly".
- J) Sections of limited width are generally, short sections of a waterway with limited width and well known to boatmasters.
- i) To be used on a limited basis only for short sections.
 - ii) Names of the sections shall be those, which are generally known by the boatmasters. In case no specific name is known the name of the closest town or land region should be used.

18 Geo Features – Aids to Navigation – Overview

In the context of this Product Specification, the following generic term definitions apply:

Beacon: A fixed artificial navigation mark that can be recognised by its shape, colour, pattern, topmark or light character, or a combination of these. It may carry various additional aids to navigation. This term is not commonly used when the navigation mark can be classified as a lighthouse. (IHO Dictionary - S-32).

Buoy: A floating object moored to the bottom in a particular (charted) place, as an aid to navigation or for other specific purposes. Navigational buoys may be classified according to: (a) their shape, appearance, or construction, such as barrel, can, cask, conical, cylindrical, dan, keg, nun, pillar, spar, spherical, or topmark buoy; (b) their colour, such as black, chequered, green, red buoy; (c) their location, such as bifurcation, fairway, junction, mid-channel, middle-ground, or turning buoy; (d) the various kinds of hazards or dangers to navigation which they mark, such as bar, isolated danger, fish trap, obstruction, spoil ground, telegraph or wreck buoy; (e) their particular purpose or use, such as anchor, anchorage, compass adjustment, dredging, farewell (or landfall), marker, quarantine, station (or watch), or warping buoy. (IHO Dictionary - S-32).

18.1 Geo features forming parts of navigational aids

Aids to navigation are composed of fixed or floating structure features established specifically as an aid to navigation, which may carry equipment features.

When identifying relationships (associations) between aids to navigation and associated geo features within this document, three “base classes” are used to define the aids to navigation geo features included in the relevant association. These “base classes” are:

- Structure Features: Includes **Cardinal Beacon**, **Cardinal Buoy**, **Daymark**, **Emergency Wreck Marking Buoy**, **Installation Buoy**, **Isolated Danger Beacon**, **Isolated Danger Buoy**, **Lateral Beacon**, **Lateral Buoy**, **Landmark**, **Pile**, **Safe Water Beacon**, **Safe Water Buoy**, **Special Purpose/General Beacon**, **Special Purpose/General Buoy**.
- Equipment Features: Includes **Daymark**, **Fog Signal**, **HeliPad** (exceptionally, see 2nd Remarks bullet below), **Light Air Obstruction**, **Light All Around**, **Light Sectored**, **Physical AIS Aid to Navigation**, **Radar Reflector**, **Radar Transponder Beacon**, **Signal Station Traffic**, **Signal Station Warning**.
- Navigational Aid Features: Includes **Cardinal Beacon**, **Cardinal Buoy**, **Daymark**, **Emergency Wreck Marking Buoy**, **Installation Buoy**, **Isolated Danger Beacon**, **Isolated Danger Buoy**, **Lateral Beacon**, **Lateral Buoy**, **Pile**, **Safe Water Beacon**, **Safe Water Buoy**, **Special Purpose/General Beacon**, **Special Purpose/General Buoy**.

The encoding of relationships between structure and equipment features is described in clause 18.2.

Remarks: Exceptionally,

- Structures that have not been established specifically as an aid to navigation may also carry aids to navigation as equipment features. These include **Bridge**, **Building**, **Cable Overhead**, **Conveyor**, **Crane**, **Dolphin**, **Floating Dock**, **Fortified Structure**, **Fishing Facility**, **Hulk**, **Landmark**, **Offshore Platform**, **Pipeline Overhead**, **Pontoon**, **Pylon/Bridge Support**, **Obstruction**, **Shoreline Construction**, **Silo/Tank**, **Span Fixed**, **Span Opening**, **Wind Turbine**, **Wreck**. If it is required to encode such supporting structures at the same location as an equipment feature, it must be encoded as a separate feature, and share the same spatial type as (for point structures), or cover the location of (for structures of type curve or area) the equipment feature.

- Substantive structures, which may carry helipads, erected in the water and intended to perform the function of light support must be encoded, where required, using the feature **Landmark** (see clauses 7.2 and 25.12). Exceptionally, **Helipad** features may also, if required, be associated to **Building**, **Landmark** or **Offshore Platform** features that do not additionally perform the function of a support for an aid to navigation, using the feature association **Structure/Equipment** (see clause 18.2).
- Topmarks are encoded as part of the navigational aid structure, using the complex attribute **topmark** (see clause 29.37).
- Radar reflectors must not be encoded as separate features when attached to navigational aids. If it is required to encode their existence, it must be done by populating the Boolean attribute **radar conspicuous** = *True*. Radar reflectors may only be encoded where their position is known and they are included as equipment features on an overhead cable structure feature (see clauses 6.10.1, 20.15.1 and 25.12).
- Rescue stations and coast guard stations are not related to navigation, and they must not, therefore, be part of the equipment features of navigational aids. If it is required to encode a rescue or coast guard station at the same location as a navigational mark, it must be encoded as a separate feature, and share the same spatial type as the navigational aid.

18.2 Relationships

A **Structure/Equipment** feature association (see clause 25.12) must be created in order to relate the different features comprising a navigational aid. Where a **Structure/Equipment** feature association is created, there must be only one structure feature related to one or more equipment features. An equipment feature must not be related to more than one structure feature.

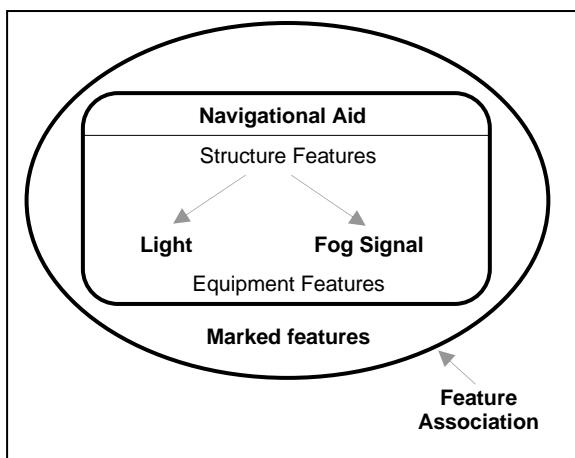


Figure 18-1 – Navigational aids – Structure/equipment association

Note that **Daymark** may be a structure feature or an equipment feature (refer to the lists of structure and equipment features at clause 18.1); where a navigational aid contains a **Daymark** and there is no other base structure (which can serve as the structure feature) indicated on the source, the **Daymark** feature should be encoded as the structure feature. A single **Daymark** feature instance must not be both a structure and an equipment feature.

When the nature of the base structure on land is unknown or there is no structure feature, one of the equipment features may be chosen as the structure feature, giving priority to a **Light All Around** or **Light Sectored** feature, if one exists (however, see also clause 19.1.8). Where this

occurs, the light feature must be encoded as the structure feature in the **Structure/Equipment** relationship. Alternatively, a **Pile** feature of type point or a **Special Purpose/General Beacon** feature may be encoded as the structure feature at the same position as the equipment features. When a light is located in the water with no indication on the source of the structure feature, regardless of the height of the light, a **Pile** feature of type surface or a **Special Purpose/General Beacon** feature should be encoded as the structure feature. This will ensure that a symbol will be shown on Inland ECDIS or ECS systems when the light features are not displayed during daytime navigation.

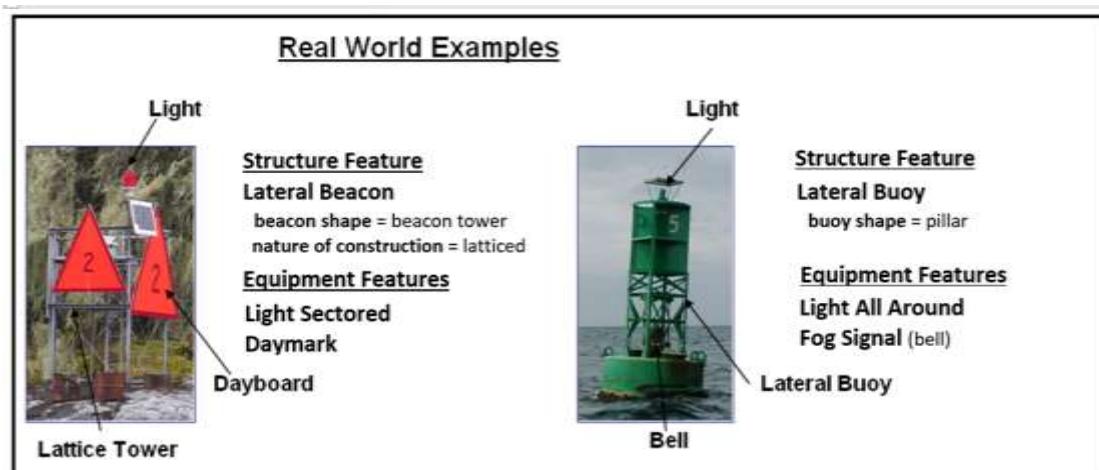


Figure 18-2 – Navigational aids – Structure/equipment feature associations: Real-world examples

In the above real-world examples, the structure and equipment features that make up the navigational aids are point spatial types, and they must share the same geographic point spatial type.

If it is required to encode the name of the navigational aid, it must be done using the complex attribute **feature name** (see clause 2.5.8) on the structure feature. The name must not be repeated for the equipment features. If the name is painted on the structure, it must be encoded with the same spelling in the complex attribute **feature name**. If the name is not based on the Latin alphabet, it must be encoded using **feature name (name)**, with an appropriate value populated for the sub-attribute **language**, and transliterated for encoding on an iteration of **feature name (name)** with an appropriate value populated for the mandatory attribute **language** (normally English (eng)).

All point features comprising a navigational aid must share the same geographic point spatial instance.

Remarks:

- For guidance related to the population of the temporal attributes **date end** and **date start** for equipment features in a **Structure/Equipment** association relationship, see clause 2.4.9.

18.3 Buoyage systems and direction of buoyage

Systems of buoyage are described as lateral, cardinal, or a combination of lateral and cardinal. Lateral systems depend on a direction of buoyage being defined. The cardinal system depends solely on the main points of the compass. Special purpose buoys often mark the limits or centre

of an area (for example an exercise area, a dumping ground) and do not necessarily have lateral or cardinal system characteristics.

The IALA Maritime Buoyage System details, including the extent of Regions A and B, are given in other publications (for example UK's booklet NP 735 "IALA Maritime Buoyage System"). Although it is called a buoyage system, it applies to all fixed and floating marks except lighthouses, some sector lights, leading lights and marks, major floating lights and lights on offshore structures. Six types of marks are provided by the system: Lateral, Cardinal, Isolated danger, Safe water, Special and Emergency Wreck Marking marks, which may be used in any combination.

18.3.1 Buoyage systems and direction of buoyage

The buoyage system of the area covered by the dataset and, where necessary, the direction of buoyage, must be encoded using the Meta features **Navigational System of Marks** and **Local Direction of Buoyage**:

All parts of the dataset containing data must be covered by **Navigational System of Marks** features (see clause 3.6), with the mandatory attribute **marks navigational – system of** indicating the buoyage system in operation. **Navigational System of Marks** features must not overlap.

Within a dataset, there may be some areas where the direction of buoyage is defined by local rules and must, therefore, be specified. These areas should be encoded as separate **Local Direction of Buoyage** features (see clause 3.7), with the mandatory attribute **orientation value** indicating the direction of buoyage. **Local Direction of Buoyage** features must not overlap, but in areas where local buoyage directions apply, **Local Direction of Buoyage** features must overlap **Navigational System of Marks** features (see Figure 18-3 below).

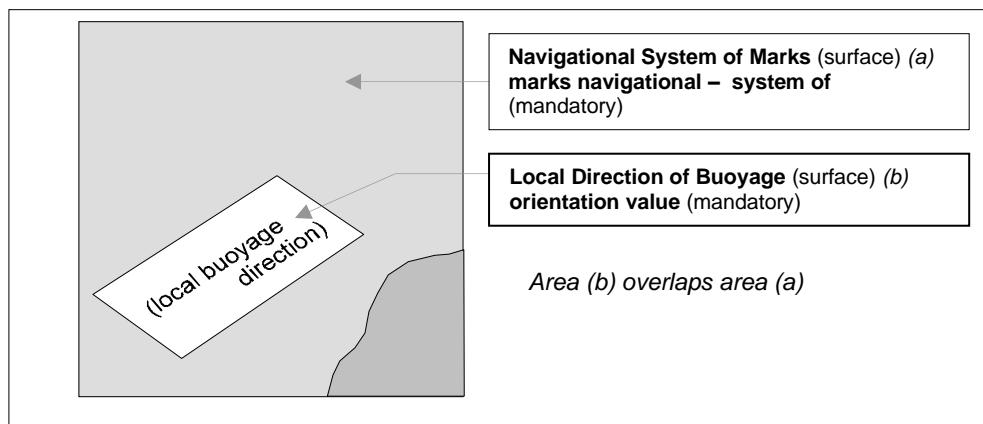


Figure 18-3 – Buoyage system and direction

Individual buoys and beacons may not be part of the general buoyage system. This should be encoded using the attribute **marks navigational – system of** on these buoy and beacon features.

18.3.1.1 Encoding IALA marks within IALA A or B

In the following Tables the symbol '/' indicates that this attribute is not relevant for that particular feature class. The Tables contain the most common examples of encoding; other encoding combinations are possible. For encoding of buoys, substitute **Buoy** for **Beacon** in the Feature column. Table 18-3 for topmarks refers to the sub-attribute values for the complex attribute **topmark**.

Real World Feature	Feature	category of cardinal mark	colour	colour pattern	marks navigational – system of
North cardinal beacon	Cardinal Beacon	1	2,6	1	1 and 2 (IALA A and B)
East cardinal beacon	Cardinal Beacon	2	2,6,2	1	1 and 2 (IALA A and B)
South cardinal beacon	Cardinal Beacon	3	6,2	1	1 and 2 (IALA A and B)
West cardinal beacon	Cardinal Beacon	4	6,2,6	1	1 and 2 (IALA A and B)
Port lateral beacon	Lateral Beacon	1	3	/	1 (IALA A)
Starboard lateral beacon	Lateral Beacon	2	4	/	1 (IALA A)
Preferred channel to starboard lateral beacon	Lateral Beacon	3	3,4,3	1	1 (IALA A)
Preferred channel to port lateral beacon	Lateral Beacon	4	4,3,4	1	1 (IALA A)
Port lateral beacon	Lateral Beacon	1	4	/	2 (IALA B)
Starboard lateral beacon	Lateral Beacon	2	3	/	2 (IALA B)
Preferred channel to starboard lateral beacon	Lateral Beacon	3	4,3,4	1	2 (IALA B)
Preferred channel to port lateral beacon	Lateral Beacon	4	3,4,3	1	2 (IALA B)

Table 18-1 – IALA cardinal and lateral marks – Attribute encoding

Real World Feature	Feature	colour	colour pattern	marks navigational – system of
Emergency wreck marking buoy	Emergency Wreck Marking Buoy	5,6 or 6,5	2	1 and 2 (IALA A and B)
Isolated danger beacon	Isolated Danger Beacon	2,3,2	1	1 and 2 (IALA A and B)
Safe water beacon	Safe Water Beacon	3,1 or 1,3	2	1 and 2 (IALA A and B)
Special purpose beacon	Special Purpose/General Beacon	6	/	1 and 2 (IALA A and B)

Table 18-2 – IALA emergency wreck marking, isolated danger, safe water and special purpose/general marks – Attribute encoding

Real World Feature	Feature	topmark / daymark shape	colour*	colour pattern*	marks navigational – system of
North cardinal topmark	Cardinal Beacon	13	2	/	1 and 2 (IALA A and B)
East cardinal topmark	Cardinal Beacon	11	2	/	1 and 2 (IALA A and B)
South cardinal topmark	Cardinal Beacon	14	2	/	1 and 2 (IALA A and B)
West cardinal topmark	Cardinal Beacon	10	2	/	1 and 2 (IALA A and B)
Isolated danger topmark	Isolated Danger Beacon	4	2	/	1 and 2 (IALA A and B)
Port lateral topmark	Lateral Beacon	5	3	/	1 (IALA A)
Starboard lateral topmark	Lateral Beacon	1	4	/	1 (IALA A)
Port lateral topmark	Lateral Beacon	5	4	/	2 (IALA B)
Starboard lateral topmark	Lateral Beacon	1	3	/	2 (IALA B)
Safe water topmark	Safe Water Beacon	3	3	/	1 and 2 (IALA A and B)
Special purpose topmark	Special Purpose/General Beacon	7	6	/	1 and 2 (IALA A and B)
Emergency wreck marking topmark	Emergency Wreck Marking Buoy	8	6	/	1 or 2 (IALA A or B)

Table 18-3 – IALA topmarks – Attribute encoding

* If it is required to encode an aid to navigation that may be considered to be a topmark but has multiple colours that are considered important for navigation, this should be done using the feature **Daymark** (see clause 20.14).

19 Geo Features – Lights

For the purpose of encoding lights in IENC, the following features must be used, depending on the type of light:

- **Light All Around** (see clause 19.2) for lights having the same character over the whole horizon of interest to marine navigation (all-round lights), excluding fog detector and air obstruction lights;
- **Light Sectored** (see clause 19.3) for lights having one or more sectors which have different characteristics, including directional lights and lights having obscured or partially obscured sectors; and
- **Light Air Obstruction** (see clause 19.4) for lights marking an obstacle which constitutes a danger to air navigation.

When encoding a light, the combination of the character and purpose of the light must be evaluated in order to determine the most appropriate light feature from the above list.

19.1 Lights: General

19.1.1 Rhythms of lights

The principal character of a light is its rhythm (although, strictly, fixed lights and some alternating lights are not “rhythmic”).

If it is required to encode the rhythms of lights, this must be done using the complex attribute **rhythm of light**, sub-attributes **light characteristic** and **signal group**. When populating **rhythm of light**, the sub-attributes **signal group**, **signal period** and **signal sequence** are only valid for non-fixed lights (that is, sub-attribute **light characteristic** ≠ 1 (fixed)), with **signal group** and **signal period** being mandatory.

The use of these sub-attributes is defined in the following Table; it contains the most common examples of coding; other coding combinations are possible:

Rhythms of lights	F	Oc	Oc(2)	Oc(2+3)	Iso	Fl	Fl(3)	LFl
light characteristic	1	8	8	8	7	2	2	3
signal group	prohibited	(1)	(2)	(2+3)	(1)	(1)	(3)	(1)

Rhythms of lights	Q	Q(3)	VQ	VQ(3)	UQ	IUQ
light characteristic	4	4	5	5	6	11
signal group	(1)	(3)	(1)	(3)	(1)	()

Rhythms of lights	Mo(K)	FFI	Q(6)+LFI	VQ(6)+LFI	AI.WR	AI.FI.WR	AI.FI(2W+1R)	AI.Oc(4)WR
light characteristic	12	13	25	26	28	19	19	17
signal group	(K)	()(1)	(6)(1)	(6)(1)	()	(1)	(2+1)	(4)

Table 19-1 – Rhythms of lights – Common encoding examples

19.1.2 Types and functions of lights

If it is required to encode types and functions of lights, this must be done using the attribute **category of light** (see clause 27.55).

19.1.3 Elevations of lights

The elevation of a light is the vertical distance between the light source and the plane of reference for heights for the IENC data (see clause 2.5.7).

If it is required to encode the elevation of a light on a fixed structure, it must be done using the attribute **height**.

If it is required to encode the height above the water surface of a light on a floating structure, it must be done using the attribute **vertical length** on the relevant light feature (see clause 2.5.7).

19.1.4 Times of exhibition and exhibition conditions

19.1.4.1 Night lights

If it is required to encode a night light, it must be done using the attribute **exhibition condition of light = 4** (night light) on the light feature.

19.1.4.2 Unwatched lights

This information should not be encoded, but unwatched (unmanned) lights, with no standby or emergency arrangements, may be encoded using attribute **status = 17** (unwatched).

19.1.4.3 Occasional lights

If it is required to encode an occasional light, it must be done using attribute **status = 2** (occasional). If it is required to encode a private light that is not regularly exhibited, it must be done using **status = 2,8** (occasional, private).

19.1.4.4 Daytime lights

If it is required to encode a light shown throughout 24 hours without change of character, it must be done using attribute **exhibition condition of light = 1** (light shown without change of character).

If it is required to encode a light having characteristics shown by day different from those shown at night, it must be done by encoding two light features sharing the same point spatial instance:

- one light feature with **exhibition condition of light = 2** (daytime light),
- one light feature with **exhibition condition of light = 4** (night light).

19.1.4.5 Fog lights

If it is required to encode a light which is exhibited in fog or conditions of reduced visibility, it must be done using a light feature, with attributes **exhibition condition of light = 3** (fog light) and **status = 2** (occasional).

If it is required to encode a light having characteristics shown in fog that are different from those shown in conditions of normal visibility, it must be done by encoding two light features sharing the same point spatial instance:

- one light feature with **exhibition condition of light = 3** (fog light) and **status = 2** (occasional)
- one light feature with **exhibition condition of light = 2** (daytime light) or **4** (night light) and the complex attribute **information** (see clause 2.4.6), sub-attribute **text = Character of the light changes in fog**.

19.1.4.6 Manually-activated lights

If a light is radio activated, the attribute **signal generation** must be populated with value **5** (radio activated). To encode the contact information for activation of the light, it must be done using the information type **Contact Details** (see clause 24.1). The **Contact Details** must be associated to the light feature using the association **Additional Information**.

If a light is activated by calling into a manned station, the attribute **signal generation** must be populated with value **6** (call activated). To encode the contact information for the manned station, it must be done using the information type **Contact Details**. The **Contact Details** must be associated to the light feature using the association **Additional Information**.

19.1.5 Leading lights

If it is required to encode a leading light, it must be done using an appropriate light feature, with attribute:

category of light = 4, 12 - front leading light
 4, 13 - rear leading light
 4, 14 - lower leading light
 4, 15 - upper leading light

Remarks:

- Even if, on the source, the leading lights are merged into a single symbol, a light feature must be created for each light. These lights must be placed in their true position; that is, where the source shows a single light with a legend such as *2F.Bu*, further investigation must be done in order to determine the true position of each light, and its full attribution. Compilers should note that where this occurs on paper charts, the position of the light shown on the chart normally corresponds with the rear leading light.
- The leading line must be encoded using the method described in clause 15.1.
-

19.1.6 Lighthouses

If it is required to encode a lighthouse, it must be done using a **Landmark** feature (see clause 7.2), with attributes **category of landmark** = 17 (tower) and **function** = 33 (light support) for towers, or using a **Building** feature (see clause 6.2), with the attribute **function** = 33, for any other shapes.

If it is required to encode the attributes **elevation**, **height** and **vertical length** for a lighthouse, this must be done as described in clause 19.1.3.

If the lighthouse is permanently extinguished/unlit, this must be indicated by population of the attribute **status** = 4 (not in use) for the **Landmark/Building**, and the light feature must be removed. Where a lighthouse is illuminated by flood lights, the additional value of **status** = 12 (illuminated) must also be populated. For lights that are temporarily extinguished, see clause 31.2.2 – paragraph 10(i).

19.1.7 Various special types of lights

Type	category of light	Remarks
Subsidiary light	10	Encoded as a separate light from the main light feature
Aero light	5	
Air obstruction light		Encode using feature Light Air Obstruction
Bearing light	18	
Flood light	8	Only to encode flood lights that are visible from seaward. The illuminated structure should be encoded using appropriate feature classes, with attribute status = 12 (illuminated) and, if the flood lit colour of the structure is considered important for navigation, complex attribute information , sub-attribute text indicating the colour; for example, <i>Purple when flood lit</i> .
Synchronized lights		status = 15.
Strip light	9	

Spot light	11	Only to encode spot lights that are visible from seaward. The illuminated feature should be encoded using appropriate feature classes, with attribute status = 12 (illuminated)
Emergency light	17	Must be encoded as a separate feature to the main light feature
Horizontally disposed lights	19	The number of lights must be encoded using complex attribute multiplicity of features
Vertically disposed lights	20	The number of lights must be encoded using complex attribute multiplicity of features
Specific pattern of lights		The pattern must be encoded using complex attribute information , sub-attribute text ; for example <i>lights disposed in the shape of a triangle</i> . The number of lights must be encoded using complex attribute multiplicity of features

Table 19-2 – Special types of lights

19.1.8 Light structures

Light features located in the water must have a structure feature, generally a beacon (for example **Lateral Beacon**, **Special Purpose/General Beacon**) or other fixed structure (for example **Offshore Platform**), or a buoy structure (for example **Lateral Buoy**, **Special Purpose/General Buoy**) for floating aids to navigation. When a light is located in the water with no indication on the source of the structure feature, regardless of the height of the light, a **Pile** feature of type surface or a **Special Purpose/General Beacon** feature should be encoded as the structure feature. This will ensure that a symbol will be shown on Inland ECDIS or ECS systems when the light features are not displayed during daytime navigation.

The light portrayal rules for Inland ECDIS or ECS result in the display of **Light All Around** features with Boolean attribute **major light** = *True* using a 360° light sector. On land, if no aid to navigation structure object has been encoded at the position of these lights, the boatmaster does not have a displayed centre point to take bearings to:

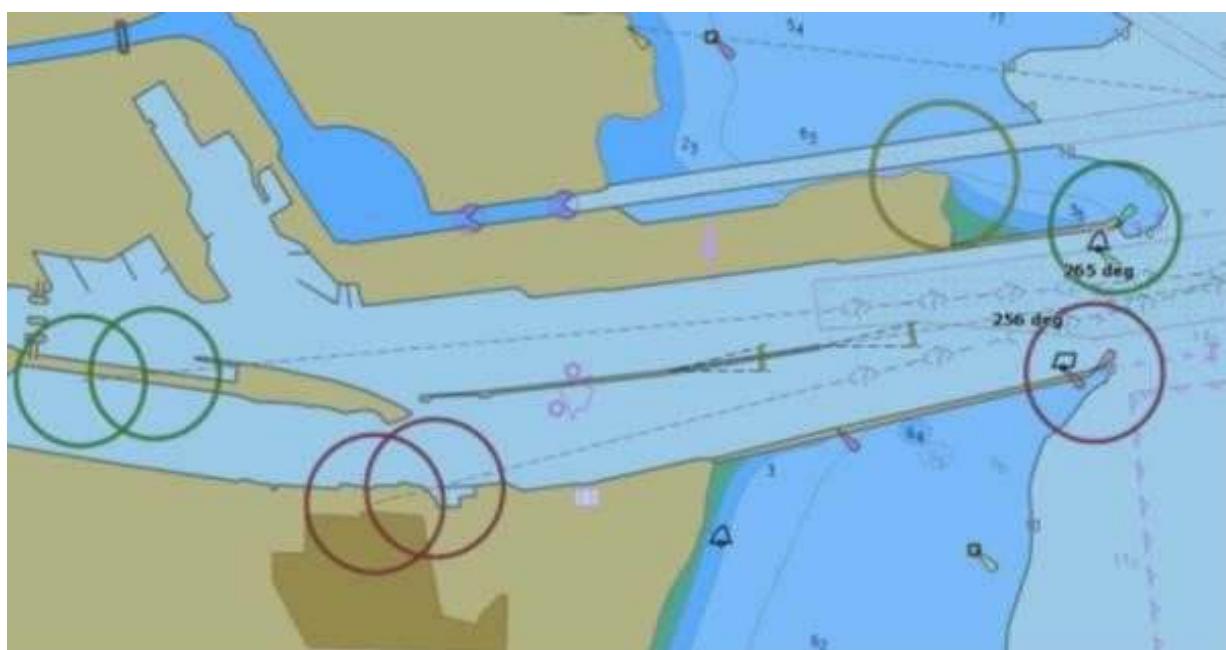


Figure 19-1 – Omnidirectional light display in Inland ECDIS or ECS

Encoders are advised, therefore, that an aid to navigation structure object (for example **Special Purpose/General Beacon, Pile**) should be encoded as a light structure object for all **Light All Around** features on land encoded as major lights, where the nature of the structure object is unknown.

19.2 Light all around

IHO Definition: **ALL AROUND LIGHT.** An all around light is a light that is visible over the whole horizon of interest to marine navigation and having no change in the characteristics of the light.

S-401 Geo Feature: Light All Around (LIGHTS) (C)

Primitives: Point

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>
		

S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of light	(CATLIT)	4 : leading light 5 : aero light 8 : flood light 9 : strip light 10 : subsidiary light 11 : spotlight 12 : front 13 : rear 14 : lower 15 : upper 17 : emergency 18 : bearing light 19 : horizontally disposed 20 : vertically disposed	EN	0,*
colour	(COLOUR)	1 : white 3 : red 4 : green 5 : blue 6 : yellow 9 : amber 10 : violet 11 : orange	EN	1,* (ordered)
exhibition condition of light	(EXCLIT)	1 : light shown without change of character 2 : daytime light 3 : fog light 4 : night light	EN	0,1

feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
<i>fixed date range</i>		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
<i>flare bearing</i>			IN	0,1
height	(HEIGHT)	[xxx.x] metres, e.g., 27.4	RE	0,1
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
light visibility	(LITVIS)	1 : high intensity 2 : low intensity 3 : faint 7 : obscured 8 : partially obscured	EN	0,1
major light			BO	0,1
marks navigational – system of	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 10 : other system 11 : main European inland waterway marking system 12 : Russian inland waterway regulations 13 : Brazilian national inland waterway regulation 15 : Paraguay-Parana waterway - Brazilian complementary aids	EN	0,1
multiplicity of features			C	0,1
multiplicity known			(S) BO	1,1
number of features	(MLTYLT)	Integer number of lights, minimum 2.	(S) IN	0,1
<i>periodic date range</i>		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
rhythm of light			C	1,1
light characteristic	(LITCHR)	1 : fixed 2 : flashing 3 : long-flashing 4 : quick-flashing 5 : very quick-flashing 6 : ultra quick-flashing 7 : isophased 8 : occulting 9 : Interrupted Quick Flashing 10 : Interrupted Very Quick Flashing 11 : interrupted ultra quick flashing 12 : morse	(S) EN	1,1

		13 : fixed and flash 14 : flash and long-flash 15 : occulting and flash 16 : fixed and long-flash 17 : occulting alternating 18 : long-flash alternating 19 : flash alternating 20 : group alternating 25 : quick-flash plus longflash 26 : very quick-flash plus long-flash 27 : ultra quick-flash plus long-flash 28 : alternating 29 : fixed and alternating flashing		
signal group	(SIGGRP)	[(x),(x)...], e.g., (), (2), (2+1)	(S) TE	0,* (ordered) [†]
signal period	(SIGPER)	[xx.xx] (e.g. signal period of 12 seconds, coded as 12)	(S) RE	0,1 [†]
signal sequence	(SIGSEQ)	[LL.L + (EE.E)] (seconds)	(S) C	0,* (ordered)
signal duration			(S) RE	1,1
signal status		1 : lit/sound 2 : eclipsed/silent	(S) EN	1,1
signal generation	(SIGGEN)	5 : radio activated 6 : call activated	EN	0,1
status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 11 : extinguished 14 : public 15 : synchronized 16 : watched 17 : unwatched	EN	0,*
value of nominal range	(VALNMR)	[xx.x]	RE	0,1
vertical datum	(VERDAT)	3 : mean sea level 10 : Approximate Lowest Astronomical Tide 12 : Mean Lower Low Water 13: low water 16 : mean high water 17 : mean high water springs 18 : high water 19 : Approximate mean sea level 20 : high water springs 21 : mean higher high water 23 : local astronomical tide 24 : local datum 25 : international great lakes datum 1985 26 : mean water level 28 : higher high water large tide 29 : nearly highest high water 30 : highest astronomical tide	EN	0,1

		31 : Local Low Water Reference Level 32 : Local High Water Reference Level 33 : Local Mean Water Reference Level 34 : Equivalent Height of Water (German GIW) 35 : Highest Shipping Height of Water (German HSW) 36 : Reference Low Water Level According to Danube Commission 37 : Highest Shipping Height of Water According to Danube Commission 38 : Dutch River Low Water Reference Level (OLR) 39 : Russian Project Water Level 40 : Russian Normal Backwater Level 41 : Ohio River Datum 43 : Dutch High Water Reference Level 44 : baltic sea chart datum 2000 45 : Dutch Estuary Low Water Reference Level (OLW)		
<i>vertical length</i>	(VERLEN)		RE	0,1
scale minimum	(SCAMIN)	[EUR: 22000, US: 60000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard	(S) EN	0, 1

		8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Structure	Structure/Equipment ¹ (see clause 25.12)	Fog Signal, Light Air Obstruction, Light All Around, Light Sectored, Radar Transponder Beacon, Sensor	Composition	0,1

¹ See clauses 18.2 and 19.1.8.

The Equipment	Structure/Equipment (see clause 25.12)	Cardinal Beacon, Cardinal Buoy, Bridge, Building, Crane, Conveyor, Daymark, Dolphin, Emergency Wreck Marking Buoy, Fishing Facility, Floating Dock, Fortified Structure, Hulk, Installation Buoy, Isolated Danger Beacon, Isolated Danger Buoy, Landmark, Lateral Beacon, Lateral Buoy, Mooring Buoy, Notice Mark, Offshore Platform, Pile, Pipeline Overhead, Pontoon, Pylon/Bridge Support, Safe Water Beacon, Safe Water Buoy, Shoreline Construction, Silo/Tank, Span Fixed, Span Opening, Special Purpose/General Beacon, Special Purpose/General Buoy, Structure Over Navigable Water, Wind Turbine, Wreck	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*
<p>[†] For non-fixed lights (that is, sub-attribute light characteristic ≠ 1 (fixed)), the sub-attributes signal group and signal period are mandatory.</p> <p>Complex attribute feature name, sub-attribute name usage is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.</p> <p>For each instance of fixed date range, at least one of the sub-attributes date end or date start must be populated.</p> <p>For each instance of information, at least one of the sub-attributes file reference or text must be populated.</p>				
<h3>19.2.1 All around lights</h3> <p>If it is required to encode an all around light (excluding fog detector and air obstruction lights), it must be done using the feature Light All Around. This feature must be an equipment feature of a structure feature (see clause 18.2), which may be another light feature at the same position (if it exists and there is no structure feature available), using a Structure/Equipment feature association.</p> <p>The IALA Maritime Buoyage System rules do not apply for most landfall lights and will apply to minor lights, but not to leading lights, some sector lights or major floating lights. In general, sector lights follow IALA convention when used for marking a channel.</p> <p>Further guidance for encoding various types and characteristics of lights can be found in clauses 19.1.1 to 19.1.7.</p>				

Remarks:

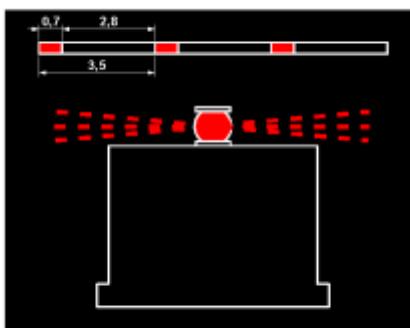
- All sector lights, whether single sectored, multi-sectored or having sectors that are deliberately obscured or completely or partially obscured by obstructions, must be encoded, where required, using the feature **Light Sectored** (see clause 19.3); for encoding a directional sector or bearing, see clause 19.3.1.2.
- Air obstruction lights must be encoded, where required, using the feature **Light Air Obstruction** (see clauses 19.4).
- If it is required to encode details of the lighting technology (for example neon), it must be done using the complex attribute **information** (see clause 2.4.6).
- If it is required to encode the purpose of a spotlight, it must be done using the complex attribute **information**.
- Lights on land encoded as major lights (Boolean attribute **major light** = *True*) must have a structure feature encoded (see clause 19.1.8) in order for the position of the light to be clearly indicated in the Inland ECDIS or ECS.
- The attribute **vertical datum** applies only to **height**; this value must only be encoded if it is different from the value of **vertical datum** encoded on the underlying meta feature **Vertical Datum of Data** (see clause 3.10).
- Value 13 (low water) for attribute **vertical datum** is only applicable to enclosed (inland) waterways; and must not be used to indicate the reference datum for the height of the light in tidal waters.
- The attribute **vertical length** only applies to lights attached to floating structures (see clause 2.5.7).
- The indication that a light is a “major” light through the population of the Boolean attribute **major light** with a *True* value determines the way the light is displayed in Inland ECDIS or ECS, and is not based on any legal or formal classification of the importance of lights. Generally, a major light may be considered to be a light intended for use at sea, usually with a range of 15 miles or more, and in outer approaches to harbours. However the determination of what is a major light may be based on a number of additional factors, including the number and characteristics of navigational (and non-navigational) lights in the geographical area, and specific navigational requirements for the area. Indication in a dataset that a light is a major light should be based only on the requirements for Inland ECDIS or ECS display, at the discretion of the producer.
- Names of major lights are very important. If a light has a name which is unrelated to any other encoded feature, the name must be populated using the complex attribute **feature name** (see clause 2.5.8) on at least the largest optimum display scale IENC data. If the name of a light is obviously that of the named feature on which the light stands, for example Saint Catherine’s Point, the name of the light need not be repeated for the light.

Distinction: Cardinal Beacon; Cardinal Buoy; Emergency Wreck Marking Buoy; Installation Buoy; Isolated Danger Beacon; Isolated Danger Buoy; Lateral Beacon; Lateral Buoy; Light Air Obstruction; Light Sectored; Safe Water Beacon; Safe Water Buoy; Special Purpose/General Beacon; Special Purpose/General Buoy.

Inland specific Encoding Instructions:

- A) **Feature name** (OBJNAM) should be placed on the supporting structure (structure feature) and not on the **Light All Around** (LIGHTS).
- B) When no specific signal group is provided, use SIGGRP=().
- C) If there are multiple lights in the same position, make one **Light All Around** (LIGHTS) feature and use **multiplicity of features** (MLTYLT) to define the number of lights represented.
- D) US: **status** (STATUS) = 8 (private)
- E) US: Western River Rules, RED will always be a double flash **signal group** (SIGGRP) (2), and Green will always be a single flash.
- F) The light characteristic LITCHR is defined as follows:

1. fixed: a signal light that shows continuously, in any given direction, with constant luminous intensity and colour
 2. flashing: a rhythmic light in which the total duration of light in a period is clearly shorter than the total duration of darkness, and all the appearances of light are of equal duration
 3. long-flashing: a flashing light in which a single flash of not less than two seconds duration is regularly repeated
 4. quick-flashing: a light exhibiting without interruption very rapid regular alternations of light and darkness
 5. very quick flashing: a flashing light in which flashes are repeated at a rate of not less than 80 flashes per minute but less than 160 flashes per minute
 6. ultra quick flashing: a flashing light in which flashes are repeated at a rate of not less than 160 flashes per minute
 7. isophased: a light with all durations of light and darkness equal
 8. occulting: a rhythmic light in which the total duration of light in a period is clearly longer than the total duration of darkness and all the eclipses are of equal duration
 9. interrupted quick flashing: a quick light in which the sequence of flashes is interrupted by regularly repeated eclipses of constant and long duration
 10. interrupted very quick flashing: a light in which the very rapid alterations of light and darkness are interrupted at regular intervals by eclipses of long duration
 11. interrupted ultra quick flashing: a light in which the ultra quick flashes (160 or more per minute) are interrupted at regular intervals by eclipses of long duration
 12. morse: a rhythmic light in which appearances of light of two clearly different durations are grouped to represent a character or characters in the Morse code
 28. alternating: a signal light that shows, in any given direction, two or more colours in a regularly repeated sequence with a regular periodicity
- G) The signal period SIGPER is the time occupied by an entire cycle of intervals of light and eclipse.
- H) The signal group SIGGRP is the number of signals, the combination of signals or the morse character(s) within one period of full sequence. The signal group of a light is encoded using brackets to separate the individual groups. A group of signals may be a single number, a chain of numbers separated by "+", a sequence of up to 4 letters or a letter and a number. A fixed light has no signal group. Where no specific signal group is given for one of the light characteristics, this should be shown by an empty pair of brackets.
- I) The sequence of times occupied by intervals of light and eclipse is encoded in SIGSEQ. Example: "00.8+(02.2)+00.8+(05.2)" encodes a signal sequence with two intervals of light and two intervals of eclipse.
- J) Example of encoding: red night light on a buoy (see illustration): **Light All Around (LIGHTS)** (**colour (COLOUR)** 3, **exhibition condition of light (EXCLIT)** 4, **light characteristic (LITCHR)** 4, **signal period (SIGPER)** 3.5, **signal group (SIGGRP)** (), **signal sequence (SIGSEQ)** 00.7+(02.8), **status (STATUS)** 14, **scale minimum (SCAMIN)** 22000)



- K) Official aids to navigation shall be encoded.

- L) US: For airport runway lights, encode **category of light** (CATLIT) = 5 (aero light). Encode **exhibition condition of light** (EXCLIT) = 4 (night light) if appropriate
- M) Lights on the towers of overhead pipes should be encoded.
- N) US: descending bank (e.g. LDB for left descending bank, should be encoded in **information** (INFORM).

19.3 Light sectored

IHO Definition: **SECTOR LIGHT.** A light presenting different appearances (in particular, different colours) over various parts of the horizon of interest to maritime navigation. (IHO Dictionary – S-32).

S-401 Geo Feature: Light Sectored (LIGHTS) (C)

Primitives: Point

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of light	(CATLIT)	4 : leading light 5 : aero light 8 : flood light 9 : strip light 10 : subsidiary light 11 : spotlight 12 : front 13 : rear 14 : lower 15 : upper 17 : emergency 18 : bearing light 19 : horizontally disposed 20 : vertically disposed	EN	0,*
exhibition condition of light	(EXCLIT)	1 : light shown without change of character 2 : daytime light 3 : fog light 4 : night light	EN	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
height	(HEIGHT)	[xxx.x] metres, e.g., 27.4	RE	0,1
interoperability identifier		MRN (see clause 27.161)	URN	0,1

marks navigational – system of	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 10 : other system 11 : main European inland waterway marking system 12 : Russian Inland Waterway Regulations 13 : Brazilian National Inland Waterway Regulations 15 : Paraguay-Parana Waterway - Brazilian Complementary Aids	EN	0,1
<i>multiplicity of features</i>			C	0,1
multiplicity known			(S) BO	1,1
number of features	(MLTYLT)		(S) IN	0,1
<i>periodic date range</i>		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
sector characteristics			C	1,*
light characteristic	(LITCHR)	1 : fixed 2 : flashing 3 : long-flashing 4 : quick-flashing 5 : very quick-flashing 6 : ultra quick-flashing 7 : isophased 8 : occulting 9 : Interrupted Quick Flashing 10 : Interrupted Very Quick Flashing 11 : interrupted ultra quick flashing 12 : morse 13 : fixed and flash 14 : flash and long-flash 15 : occulting and flash 16 : fixed and long-flash 17 : occulting alternating 18 : long-flash alternating 19 : flash alternating 20 : group alternating 25 : quick-flash plus longflash 26 : very quick-flash plus long-flash 27 : ultra quick-flash plus long-flash 28 : alternating 29 : fixed and alternating flashing	(S) EN	1,1
light sector			(S) C	1,*
colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown	(S) EN	1,* (ordered)

		9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink		
directional character			(S) C	0,1 †
moiré effect			(S) BO	0,1
orientation			(S) C	1,1
orientation uncertainty			(S) RE	0,1
orientation value	(ORIENT)	[xxx.xx or "unknown"] (degree (°)), e.g., 110.76	(S) RE	1,1
light visibility	(LITVIS)	1 : high intensity 2 : low intensity 3 : faint 4 : intensified 5 : unintensified 6 : visibility deliberately restricted 7 : obscured 8 : partially obscured 9 : visible in line of range	(S) EN	0,*
sector limit			(S) C	0,1 †
sector limit one			(S) C	1,1
sector bearing	(SECTR1)	sector limit one/sector bearing ≠ sector limit two/sector bearing (0 = 360)	(S) RE	1,1
sector line length			(S) RE	0,1
sector limit two			(S) C	1,1
sector bearing	(SECTR2)	sector limit two/sector bearing ≠ sector limit one/sector bearing; (0 = 360)	(S) RE	1,1
sector line length			(S) RE	0,1
value of nominal range	(VALNMR)	[xx.x]	(S) RE	0,1
sector information			(S) C	0,*
language		ISO 639-2/T	(S) TE	0,1
text	(INFORM) (NINFORM)		(S) TE	1,1
sector arc extension			(S) BO	0,1
signal group	(SIGGRP)	[(x),(x)...], e.g., (), (2), (2+1)	(S) TE	0,* (ordered) †
signal period	(SIGPER)	[xx.xx] (e.g. signal period of 12 seconds coded as "12")	(S) RE	0,1 †
signal sequence	(SIGSEQ)	[LL.L + (EE.E)] (seconds)	(S) C	0,* (ordered)
signal duration			(S) RE	1,1
signal status		1 : lit/sound 2 : eclipsed/silent	(S) EN	1,1
signal generation	(SIGGEN)	5 : radio activated 6 : call activated	EN	0,1

status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 11 : extinguished 14 : public 15 : synchronized 16 : watched 17 : unwatched	EN	0,*
<i>vertical datum</i>	(VERDAT)	3 : mean sea level 10 : Approximate Lowest Astronomical Tide 12 : Mean Lower Low Water 13 : low water 16 : mean high water 17 : mean high water springs 18 : high water 19 : approximate mean sea level 20 : high water springs 21 : mean higher high water 23 : lowest astronomical tide 24 : local datum 25 : international great lakes datum 1985 26 : mean water level 28 : higher high water large tide 29 : nearly highest high water 30 : highest astronomical tide 31 : Local Low Water Reference Level 32 : Local High Water Reference Level 33 : Local Mean Water Reference Level 34 : Equivalent Height of Water (German GIW) 35 : Highest Shipping Height of Water (German HSW) 36 : Reference Low Water Level According to Danube Commission 37 : Highest Shipping Height of Water According to Danube Commission 38 : Dutch River Low Water Reference Level (OLR) 39 : Russian Project Water Level 40 : Russian Normal Backwater Level 41 : Ohio River Datum 43 : Dutch High Water Reference Level 44 : baltic sea chart datum 2000 45 : Dutch Estuary Low Water Reference Level (OLW)	EN	0,1
scale minimum	(SCAMIN)	[EUR: 22000, US: 60000] or see clause 2.5.9	IN	1,1

information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
Reported Date	(SORDAT)		TD	0, 1
Pictorial Representation	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 3 : alternate name display 4	(S) EN	0,1 †

Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Structure	Structure/Equipment ² (see clause 25.12)	Fog Signal, Light Air Obstruction, Light All Around, Light Sectored, Radar Transponder Beacon, Sensor	Composition	0,1
The Equipment	Structure/Equipment (see clause 25.12)	Bridge, Building, Crane, Cardinal Beacon, Conveyer, Daymark, Dolphin, Fishing Facility, Fortified Structure, Isolated Danger Beacon, Landmark, Lateral Beacon, Offshore Platform, Notice Mark, Pile, Pipeline Overhead, Pylon/Bridge Support, Safe Water Beacon, Shoreline Construction, Silo/Tank, Span Fixed, Span Opening, Special Purpose/General Beacon, Structure Over Navigable Water, Wind Turbine, Wreck	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] For non-fixed lights (that is, sub-attribute **light characteristic** ≠ 1 (fixed)), the sub-attributes **signal group** and **signal period** are mandatory.

For a light sector that is a directional sector, the sub-complex attribute **directional character** is mandatory.

For a light sector that is not a directional sector (that is, sub-complex attribute **directional character** is not populated), the sub-complex attribute **sector limit** is mandatory.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

19.3.1 Sectored lights

If it is required to encode a light that consists of one or more sectors, it must be done using the feature **Light Sectored**. This feature must be an equipment feature of a structure feature (see clause 18.1), which may be another light feature at the same position (if it exists and there is no structure feature available), using a **Structure/equipment** feature association.

² See clause 18.2.

The IALA Maritime Buoyage System rules do not apply for most landfall lights and will apply to minor lights, but not to leading lights, some sector lights or major floating lights. In general, sector lights follow IALA convention when used for marking a channel.

Further guidance for encoding various types and characteristics of lights can be found in clauses 19.1.1 to 19.1.7.

Remarks:

- The complex attribute **sector characteristics**, sub-complex attribute **light sector** is used to populate each sector for the light, except for sectors in which there is no light exhibited. Where there is a different rhythm of light between sectors (for example, for complex lights), separate instances of **sector characteristics** must be populated.
- Population of the sub-complex attribute **sector limit** having sub-attributes **sector limit one** = 0 and **sector limit two** = 360 (that is, encoding an all around light as a sectored light) is prohibited.
- If a sector of a sectored light is intended to have a directional function, this must be encoded using the **light sector** complex sub-attribute **directional character**. If the light is intensified in this sector, **light sector** subattribute **light visibility** = 4 (intensified) must be populated. The sub-complex attribute **sector limit** is optional for directional light sectors.
- The sub-attribute **sector line length** (see clause 27.220) may be used for critical light sectors to extend the sector line when the Inland ECDIS or ECS display settings are set to display default sector lines. The intended usage of the IENC dataset must be considered when determining the usage of **sector line length** so as to avoid excessive screen clutter when default sector display is enabled; and consistent display of light sectors across the entire IENC portfolio should also be a consideration when determining the population of this attribute. Where populated, the value of **sector line length** must not exceed the value populated for the sub-attribute **value of nominal range** for the light sector.
- In some cases the area defined by the intersecting sectors of two discrete sector lights are used to indicate the existence of isolated and sometimes substantial dangers to navigation, the precise position of which may not be known. When default sectors are displayed in Inland ECDIS or ECS, the extent and intent of these sectors may not be clearly defined to the boatmaster. In order to more clearly indicate these areas, compilers should consider appropriate use of **sector line length** for the relevant sectors in the impacted area. Where it is considered important that the area of possible danger is defined, this should be done by encoding a **Caution Area** feature (see clause 16.11) covering the intersection area. Information relating to the definition of the area by sector lights and a précis of the danger should be encoded using the complex attribute **information** (see clause 2.4.6) for the **Caution Area**.
- The fairway defined by the succession of navigable areas in the white sectors of a series of **Light Sectored** features may be encoded using the feature **Fairway** (see clause 15.5).
- If there is additional information required to be encoded that is relevant to all sectors of the light, this must be done using the **information** (see clause 2.4.6). If the additional information is relevant to individual sectors of the light only (for example, for complex (oscillating) light sectors (see clause 19.3.1.3 below)), this must be encoded using the complex sub-attribute **sector information** for the sub-complex attribute **light sector**.
- If it is required to encode details of the lighting technology (for example neon), it must be done using the complex attribute **information**.
- The attribute **vertical datum** applies only to **height**; this value must only be encoded if it is different from the value of **vertical datum** encoded on the underlying meta feature **Vertical Datum of Data** (see clause 3.10).
- Value 13 (low water) for attribute **vertical datum** is only applicable to enclosed (inland) waterways; and must not be used to indicate the reference datum for the height of the light in tidal waters.
- Names of major lights are very important. If a light has a name which is unrelated to any other encoded feature, the name must be populated using the complex attribute **feature name** (see clause 2.5.8) on at least the largest scale optimum display scale IENC data. If the name of a light is obviously that of the named feature on which the light stands, for example Saint Catherine's Point, the name of the light need not be repeated for the light.

19.3.1.1 Lights obscured by obstructions

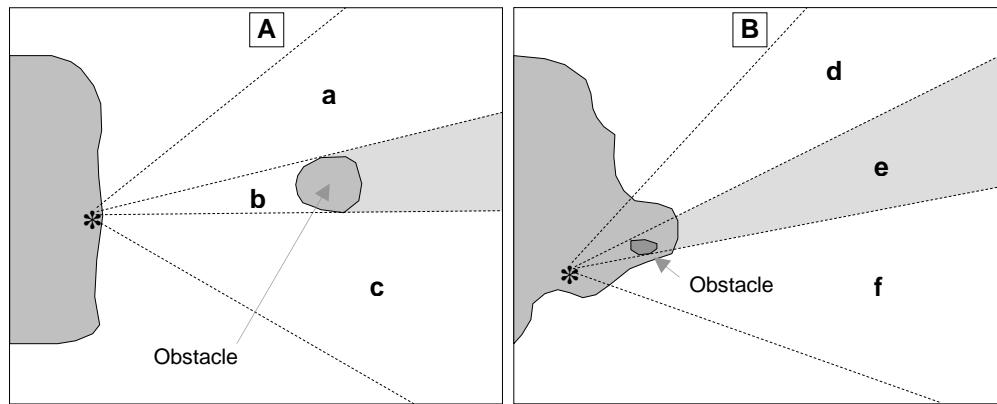


Figure 19-2 – Obscured light sectors

If an encoded light is obscured in a part of the navigable area of a sector (see Figure 19-2 (A) above) beyond an offshore obstruction, it must be encoded using **Light Sectored**, with each of the sectors (a) – (c) encoded using the complex attribute **light sector**. The partially obscured sector of (b) must have **light sector** with subattributes **light visibility** = 8 (partially obscured) and sub-attribute **value of nominal range** set to the distance from the light to the obstruction. The sectors in which the light is visible from seaward ((a) and (c)) must be encoded as separate iterations of **light sector**.

If there is no navigable water between the light and the obstacle (see (e) in Figure 19-2 (B) above), the masked sector must not have an iteration of **light sector** encoded, unless a faint light is visible in the navigable part of the sector, which should be encoded using **light sector**, with sub-attribute **light visibility** = 3 (faint). The sectors in which the light is visible from seaward ((d) and (f)) must be encoded as separate iterations of **sector characteristics**.

19.3.1.2 Directional lights

Directional (or direction) lights of several types are in use but all have in common a very narrow sector intended to mark a direction to be followed. The narrow sector may be flanked by:

- Unlit sectors or unintensified light.
- Sectors of different colour or character. Some direction lights are so precise that a complete colour change at a sector boundary occurs over an angle of less than 1 minute (0.02°). This corresponds to a lateral distance of just 1 metre at a viewing distance of 3.5 km. In addition the intensity may be maintained right to the edge of the beam, and does not reduce the further the observer is away from the axis.

A moiré effect mark (or variable arrow mark) is a short-range (normally up to 2 km) type of directional "light". Sodium lighting gives a yellow background to a screen (up to 3 m square) on which a vertical black line will be seen by an observer on the centreline, or variable arrow marks when course alteration is needed. The system can be used by day and night. It can also be used as a stop line (seen abeam) for vessels berthing along quays.

If it is required to encode a light sector having a directional function, it must be done using the feature **Light Sectored**.

Remarks:

- The indication that a particular light sector has a directional function is encoded by populating the complex attribute **sector characteristics**, sub-complex attribute **directional character**.
- The mandatory complex sub-attribute **orientation** must only be encoded to indicate the orientation, measured from seaward, of the leading line of the directional light sector when there is no

Recommended Track or Navigation Line feature associated with the directional light. Where the directional sector has an associated **Recommended Track** and/or **Navigation Line**, **orientation (orientation value)** for the light sector must be populated with an empty (null) value.

- For a sector indicated as directional, the **light sector** complex sub-complex attribute **sector limit** is optional.
- For moiré effect lights, the Boolean sub-attribute **moiré effect** must be set to *True*.
- If it is required to encode the recommended track and/or navigation line associated with a directional light, it must be done using the methods described in clause 15.1.

19.3.1.3 Oscillating light sectors

Evolving technology in the development of navigational lights has resulted in the installation of complex directional navigation lights with multiple sectors, colours and characteristics, some with oscillating sectors, in many areas where navigation is restricted. These lights may have up to 7 sectors, with the central sector being a very narrow, sometimes intensified, fixed white sector performing the directional function of the light. In the IALA A System, the sectors flanking this directional light may be alternating and oscillate increasingly from white to green (to starboard) and red (to port) with increasing deviation from the track defined by the directional light. These lights will normally be flanked by narrow sectors of fixed green (to starboard) and red (to port). Additionally, there may be outer sectors that are occulting green (to starboard) and red (to port) which oscillate with increasing period of eclipse to isophased or flashing with increasing deviation from the track defined by the directional light. For the IALA B System the colours are reversed. In some cases these complex lights may not conform to IALA. Each of the outer sectors may be very narrow.

If is required to encode an oscillating light sector, it should be done using a **Light Sectored** feature, with iterations of the complex attribute **sector characteristics** as follows:

For light sectors in the IALA A system that are alternating and oscillate increasingly from white to green (to starboard) and red (to port) with increasing deviation from the track defined by the directional light:

sector characteristics: **light characteristic** = 28 (Alternating); **colour** = 1,3 (White, Red); **sector limit**; **sector information (text)** = *White phase decreases as bearing to light increases*

sector characteristics: **light characteristic** = 28 (Alternating); **colour** = 1,4 (White, Green); **sector limit**; **sector information (text)** = *White phase increases as bearing to light increases*

For lights in the IALA B system that are alternating and oscillate increasingly from white to red (to starboard) and green (to port) with increasing deviation from the track defined by the directional light; transpose the colours red and green in the above encoding.

For lights in the IALA A system that are occulting green (to starboard) and red (to port) which oscillate with increasing period of eclipse to isophased or flashing with increasing deviation from the track defined by the directional light:

sector characteristics: **light characteristic** = 8 (Occulting); **colour** = 3 (Red); **sector limit**; **sector information (text)** = *Light phase decreases as bearing to light increases*

sector characteristics: **light characteristic** = 8 (Occulting); **colour** = 4 (Green); **sector limit**; **sector information (text)** = *Light phase increases as bearing to light increases*

For lights in the IALA B system that are occulting red (to starboard) and green (to port) which oscillate with increasing period of eclipse to isophased or flashing with increasing deviation from the track defined by the directional light; transpose the colours red and green in the above encoding.

Oscillating lights which are not IALA should be encoded similar to the above. For instance, where a light contains white sectors that are occulting and oscillate with increasing period of eclipse to isophased or flashing with increasing deviation from the track defined by the directional light:
For the sector to port of the track defined by the directional light:

sector characteristics: light characteristic = 8 (Occulting); colour = 1 (White); sector limit; sector information (text) = Light phase decreases as bearing to light increases For the sector to starboard of the track defined by the directional light:

sector characteristics: light characteristic = 8 (Occulting); colour = 1 (White); sector limit; sector information (text) = Light phase increases as bearing to light increases

All other light sectors must be encoded using additional iterations of **sector characteristics**, with subattributes (including **light sector** or **directional character**) populated in accordance with the characteristics of the sector.

Distinction: Cardinal Beacon; Cardinal Buoy; Emergency Wreck Marking Buoy; Installation Buoy; Isolated Danger Beacon; Isolated Danger Buoy; Lateral Beacon; Lateral Buoy; Light Air Obstruction; Light All Around; Safe Water Beacon; Safe Water Buoy; Special Purpose/General Beacon; Special Purpose/General Buoy.

Inland specific Encoding Instructions:

- A) **Sector limit one** (SECTR1) specifies the first limit of the sector. The order of **sector limit one** (SECTR1) and **sector limit two** (SECTR2) is clockwise around the central feature (e.g. a light).
- B) **Feature name** (OBJNAM) should be placed on the supporting structure (structure feature) and not on the **Light Sectored** (LIGHTS).
- C) The light characteristic LITCHR is defined as follows:
 1. fixed: a signal light that shows continuously, in any given direction, with constant luminous intensity and colour
 2. flashing: a rhythmic light in which the total duration of light in a period is clearly shorter than the total duration of darkness and all the appearances of light are of equal duration
 3. long-flashing: a flashing light in which a single flash of not less than two seconds duration is regularly repeated
 4. quick-flashing: a light exhibiting without interruption very rapid regular alternations of light and darkness
 5. very quick flashing: a flashing light in which flashes are repeated at a rate of not less than 80 flashes per minute but less than 160 flashes per minute
 6. ultra quick flashing: a flashing light in which flashes are repeated at a rate of not less than 160 flashes per minute
 7. isophased: a light with all durations of light and darkness equal
 8. occulting: a rhythmic light in which the total duration of light in a period is clearly longer than the total duration of darkness and all the eclipses are of equal duration
 9. interrupted quick flashing: a quick light in which the sequence of flashes is interrupted by regularly repeated eclipses of constant and long duration
 10. interrupted very quick flashing: a light in which the very rapid alternations of light and darkness are interrupted at regular intervals by eclipses of long duration
 11. interrupted ultra quick flashing: a light in which the ultra quick flashes (160 or more per minute) are interrupted at regular intervals by eclipses of long duration
 12. morse: a rhythmic light in which appearances of light of two clearly different durations are grouped to represent a character or characters in the Morse code

28. alternating: a signal light that shows, in any given direction, two or more colours in a regularly repeated sequence with a regular periodicity
- D) The signal period SIGPER is the time occupied by an entire cycle of intervals of light and eclipse.
 - E) The signal group SIGGRP is the number of signals, the combination of signals or the morse character(s) within one period of full sequence. The signal group of a light is encoded using brackets to separate the individual groups. A group of signals may be a single number, a chain of numbers separated by "+", a sequence of up to 4 letters or a letter and a number. A fixed light has no signal group. Where no specific signal group is given for one of the light characteristics, this should be shown by an empty pair of brackets.
 - F) The sequence of times occupied by intervals of light and eclipse is encoded in SIGSEQ. Example: "00.8+(02.2)+00.8+(05.2)" encodes a signal sequence with two intervals of light and two intervals of eclipse.
 - G) Official aids to navigation shall be encoded.
 - H) US: descending bank (e.g. LDB for left descending bank, should be encoded in **information** (INFORM).

19.4 Light air obstruction

IHO Definition: AIR OBSTRUCTION LIGHT. An air obstruction light is a light marking an obstacle which constitutes a danger to air navigation. (IHO Dictionary – S-32).				
S-401 Geo Feature: Light Air Obstruction (LIGHTS) (C)				
Primitives: Point				
Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
colour	(COLOUR)	1 : white 3 : red 4 : green 5 : blue 6 : yellow 9 : amber 10 : violet 11 : orange	EN	0,*
exhibition condition of light	(EXCLIT)	1 : light shown without change of character 2 : daytime light 3 : fog light 4 : night light	EN	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
flare bearing			IN	0,1
interoperability identifier		MRN (see clause 27.161)	URN	0,1
height	(HEIGHT)		RE	0,1
light visibility	(LITVIS)	1 : high intensity 2 : low intensity 3 : faint 4 : intensified 5 : unintensified 6 : visibility deliberately restricted 7 : obscured 8 : partially obscured 9 : visible in line of range	EN	0,*
multiplicity of features			C	0,1
multiplicity known			(S) BO	1,1

number of features	(MLTYLT)		(S) IN	0,1
periodic date range		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
rhythm of light			C	0,1
light characteristic	(LITCHR)	1 : fixed 2 : flashing 3 : long-flashing 4 : quick-flashing 5 : very quick-flashing 6 : ultra quick-flashing 7 : isophased 8 : occulting 9 : Interrupted quick flashing 10 : interrupted very quick flashing 11 : interrupted ultra quick flashing 12 : morse 13 : fixed and flash 14 : flash and long-flash 15 : occulting and flash 16 : fixed and long-flash 17 : occulting alternating 18 : long-flash alternating 19 : flash alternating 20 : group alternating 25 : quick-flash plus long- flash 26 : very quick-flash plus long-flash 27 : ultra quick-flash plus long-flash 28 : alternating 29 : fixed and alternating flashing	(S) EN	1,1
signal group	(SIGGRP)		(S) TE	0,* (ordered) [†]
signal period	(SIGPER)		(S) RE	0,1 [†]
signal sequence	(SIGSEQ)		(S) C	0,* (ordered)
signal duration			(S) RE	1,1
signal status		1 : lit/sound 2 : eclipsed/silent	(S) EN	1,1
status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 11 : extinguished 14 : public 15 : synchronized 16 : watched 17 : unwatched	EN	0,*
value of nominal range	(VALNMR)		RE	0,1

vertical datum	(VERDAT)	3 : mean sea level 10 : approximate lowest astronomical tide 12 : mean low water level 13 : low water 16 : mean high water 17 : mean high water springs 18 : high water 19 : approximate mean sea level 20 : high water springs 21 : mean higher high water 23 : lowest astronomical tide 24 : local datum 25 : international great lakes datum 1985 26 : mean water level 28 : higher high water large tide 29 : nearly highest high water 30 : highest astronomical tide 31 : Local Low Water Reference Level 32 : Local High Water Reference Level 33 : Local Mean Water Reference Level 34 : Equivalent Height of Water (German GIW) 35 : Highest Shipping Height of Water (German HSW) 36 : Reference Low Water Level According to Danube Commission 37 : Highest Shipping Height of Water According to Danube Commission 38 : Dutch River Low Water Reference Level (OLR) 39 : Russian Project Water Level 40 : Russian Normal Backwater Level 41 : Ohio River Datum 43 : Dutch High Water Reference Level 44 : baltic sea chart datum 2000 45 : Dutch Estuary Low Water Reference Level (OLW)	EN	0,1
scale minimum	(SCAMIN)	[EUR: 22000, US: 60000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †

condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
Reported Date	(SORDAT)		TD	0, 1
Pictorial Representation	(PICREP)		TE	0, 1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Equipment	Structure/Equipment (see clause 25.12)	Bridge, Building, Crane, Conveyor, Landmark, Offshore Platform, Pylon/Bridge Support, Span Fixed, Span Opening, Structure Over Navigable Water, Wind Turbine	Association	0,*

The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,1,*

[†] For non-fixed lights (that is, sub-attribute **light characteristic** ≠ 1 (fixed)), the sub-attributes **signal group** and **signal period** are mandatory.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

19.4.1 Air obstruction lights

If it is required to encode a light marking an obstacle which constitutes a danger to air navigation, which may also be used as a navigational aid, it must be done using the feature **Light Air Obstruction**. This feature must be an equipment feature of a structure feature (see clause 18.1) using a **Structure/Equipment** feature association.

Further guidance for encoding various types and characteristics of lights can be found in clauses 19.1.1 to 19.1.7.

Remarks:

- If it is required to encode details of the lighting technology (for example neon), it must be done using the complex attribute **information** (see clause 2.4.6).
- The attribute **vertical datum** applies only to **height**; this value must only be encoded if it is different from the value of **vertical datum** encoded on the underlying Meta feature **Vertical Datum of Data** (see clause 3.10).
- Value 13 (low water) for attribute **vertical datum** is only applicable to enclosed (inland) waterways; and must not be used to indicate the reference datum for the height of the light in tidal waters.

Distinction: Cardinal Beacon; Cardinal Buoy; Emergency Wreck Marking Buoy; Installation Buoy; Isolated Danger Beacon; Isolated Danger Buoy; Lateral Beacon; Lateral Buoy; Light All Around; Light Sectored; Safe Water Beacon; Safe Water Buoy; Special Purpose/General Beacon; Special Purpose/General Buoy.

Inland specific Encoding Instructions:

20 Geo Features – Buoys, Beacons, Notice Marks

20.1 Lateral buoy

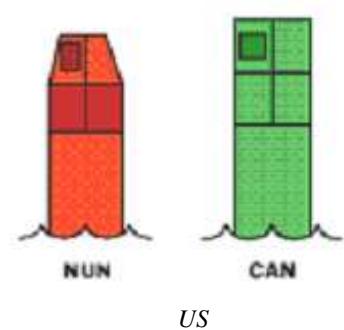
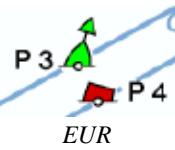
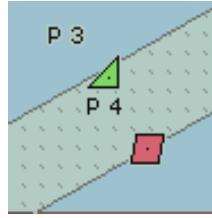
IHO Definition: LATERAL BUOY. A lateral buoy is used to indicate the port or starboard hand side of the route to be followed. They are generally used for well-defined channels and are used in conjunction with a conventional direction of buoyage. (UKHO NP 735, 5th Edition).

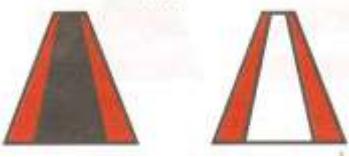
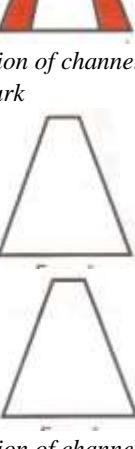
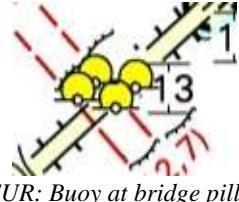
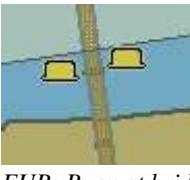
For IENCs this includes

- Buoys at bifurcations of channels (A buoy at a fairway junction may indicate by its top mark on which side it is preferable to pass (main channel)).
- Buoys at bridge pillars (A buoy at a bridge pillar may be used to improve the visibility of the pillar location on the radar.)
- Buoys marking danger points (Buoys to indicate the presence of potentially dangerous obstructions such as groins, banks, or wrecks.)
- Stalling buoys (The buoys (floating beacons) are used to mark stalling current which does not coincide with a direction of the fairway.)
- Swinging lateral buoys (The buoys are used to mark swinging points at the edges of the extended rectilinear fairways, as well as at the fairway edges where the vision is limited.)

S-401 Geo Feature: Lateral Buoy (BOYLAT, boylat) (M)

Primitives: Point

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol
 US: Can	 US	 US: Nun
 US: Nun		
		

 <p><i>EUR</i></p>  <p><i>RU</i></p>	<p><i>RU</i></p> <p><i>RU</i></p> <p><i>RU</i></p> <p><i>EUR</i></p>	<p><i>J5</i></p> <p><i>J3/M26</i></p> <p><i>Buoy at bifurcation of channel</i></p>
 <p><i>EUR Buoy at bifurcation of channel</i></p>	 <p><i>RU: Buoy at bifurcation of channel, single mark</i></p>	 <p><i>RU: Buoy at bifurcation of channel, double marks</i></p>
 <p><i>EUR Buoy at bridge pillar</i></p>	 <p><i>EUR: Buoy at bridge pillar</i></p>	 <p><i>EUR: Buoy at bridge pillar</i></p>



EUR: Buoy marking danger point



EUR: Buoy marking danger point



или



RU: Buoy marking danger point



или



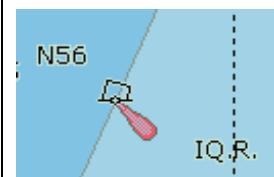
RU: Stalling buoy (RU)



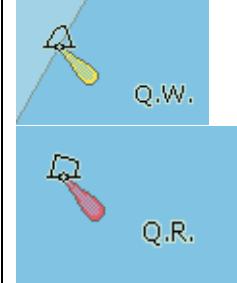
или



EUR: Buoy marking danger point



RU: Stalling buoy



RU: swinging lateral buoy



или



или



или



RU: swinging lateral buoy

S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
buoy shape	(BOYSHP)	1 : conical 2 : can 3 : spherical 4 : pillar 5 : spar 6 : barrel 7 : superbuoy 8 : ice buoy	EN	1,1
category of lateral mark	(CATLAM)	1 : port-hand lateral mark 2 : starboard-hand lateral mark 3 : preferred channel to starboard lateral mark 4 : preferred channel to port lateral mark 5 : Right-Hand Side of the Waterway 6 : Left-Hand Side of the Waterway 7 : Right-Hand Side of the Channel 8 : Left-Hand Side of the Channel 9 : Bifurcation of the Waterway 10 : Bifurcation of the Channel 11 : Channel Near the Right Bank 12 : Channel Near the Left Bank 13 : Channel Cross-Over to the Right Bank 14 : Channel Cross-Over to the Left Bank 15 : Danger Point or Obstacles at the Right-Hand Side 16 : Danger Point or Obstacles at the Left-Hand Side 17 : Turn Off at the Right-Hand Side 18 : Turn Off at the Left-Hand Side 19 : Junction at the Right-Hand Side 20 : Junction at the Left-Hand Side 21 : Harbour Entry at the Right-Hand Side 22 : Harbour Entry at the Left-Hand Side 23 : Bridge Pier Mark 24 : Entry From a Lake to a Narrower Waterway, Right Bank 25 : Entry From a Lake to a Narrower Waterway, Left Bank 26 : Change Bank 27 : Continue Along Bank	EN	1,1

colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,* (ordered)
colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1 †
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
<i>fixed date range</i>		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
marks navigational – system of	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 10 : other system 11 : main European inland waterway marking system 12 : Russian Inland Waterway Regulations 13 : Brazilian National Inland Waterway Regulations 15 : Paraguay-Parana Waterway - Brazilian Complementary Aids	EN	0,1
<i>nature of construction</i>	(NATCON)	6 : wooden 7 : metal 8 : glass reinforced plastic 11 : latticed	EN	0,*
<i>periodic date range</i>		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
radar conspicuous	(CONRAD)		BO	0,1

<i>status</i>	(STATUS)	1 : permanent 2 : occasional 5 : periodic/intermittent 7 : temporary 8 : private 18 : existence doubtful	EN	0,*
topmark	(TOPMAR)		C	0,1
colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	(S) EN	0,* (ordered)
colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe 7 : Single Colour 8 : Rectangle 9 : Triangle	(S) EN	0,1 [†]
topmark/daymark shape	(TOPSHP)	1 : cone (point up) 2 : cone (point down) 3 : sphere 4 : 2 spheres 5 : cylinder 6 : board 7 : x-shaped 8 : upright cross 9 : cube (point up) 10 : 2 cones (point to point) 11 : 2 cones (base to base) 12 : rhombus 13 : 2 cones (points upward) 14 : 2 cones (points downward) 15 : besom (point up) 16 : besom (point down) 17 : flag 18 : sphere over a rhombus 19 : square 20 : rectangle (horizontal) 21 : rectangle (vertical) 22 : trapezium (up) 23 : trapezium (down) 24 : triangle (point up) 25 : triangle (point down) 26 : circle 27 : two upright crosses (one over the other) 28 : T-shape 29 : triangle pointing up over a circle 30 : upright cross over a circle	(S) EN	1,1

		31 : rhombus over a circle 32 : circle over a triangle pointing up 33 : other shape (see shape information) 34 : tubular		
shape information			(S) C	0,*
language		ISO 639-2/T	(S) TE	0,1
text	(INFORM) (NINFORM)		(S) TE	1,1
vertical length	(VERLEN)		RE	0,1
scale minimum	(SCAMIN)	[EUR: 22000, US: 60000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 [†]
pictorial representation	(PICREP)	See clause 2.4.12.2	TE	0,1
MMSI Code	(mmsico)	[xxxxxxxx] (e.g., 366777490)	TE	0, 1
Type Of AtoN	(typatn)	1 : Aid to Navigation 2 : Physical AIS Aid to Navigation 3 : Virtual AIS Aid to Navigation	EN	0, 1
Reported Date	(SORDAT)		TD	0, 1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed	(S) EN	0, 1

		8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data		
.....Source	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Structure	Structure/Equipment (see clause 25.12)	Daymark, Distance Mark, Fog Signal, Light All Around, Notice Mark, Physical AIS Aid to Navigation, Radar Transponder Beacon, Signal Station Traffic, Signal Station Warning	Composition	0,1
The Component	Aids to Navigation Association (see clause 25.2)	Fairway System, Traffic Separation Scheme, Two-Way Route	Association	0,*
The Component	Bridge Aggregation (see clause 25.3)	Bridge	Association	0,*
The Component	Barrage Association (see clause 0)	Dam	Association	0,*
The Auxiliary Feature	Fairway Auxiliary (see clause 25.6)	Fairway	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] The attribute/sub-attribute **colour pattern** is mandatory for buoys/topmarks that have more than one value populated for the attribute/sub-attribute **colour**.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

20.1.1 Lateral buoys

Lateral buoys are generally used for well-defined channels, in conjunction with a direction of buoyage. They indicate the port and starboard sides of the route to be followed.

To conform to the IALA Maritime Buoyage System (see clause 18.3.1.1), port hand buoys are usually can shaped, but may be another shape (except conical or spherical). Other shaped buoys have a can topmark. The colour of port hand buoys, topmarks and lights (if fitted) will be red in IALA region A and green in IALA region B.

To conform to the IALA Maritime Buoyage System, starboard hand buoys are usually conical shaped, but may be another shape (except can or spherical). Other shaped buoys have a conical topmark. The colour of starboard hand buoys, topmarks and lights (if fitted) will be green in IALA region A and red in IALA region B.

A preferred channel mark is a modified lateral mark, with horizontal colour bands. The shape and predominant colour indicates which side is the preferred channel, the other colour indicates the secondary channel. If fitted, the light is Fl(2+1), the colour indicating the preferred channel.

If it is required to encode a buoy having the function of a lateral mark, it must be done using the feature **Lateral Buoy**.

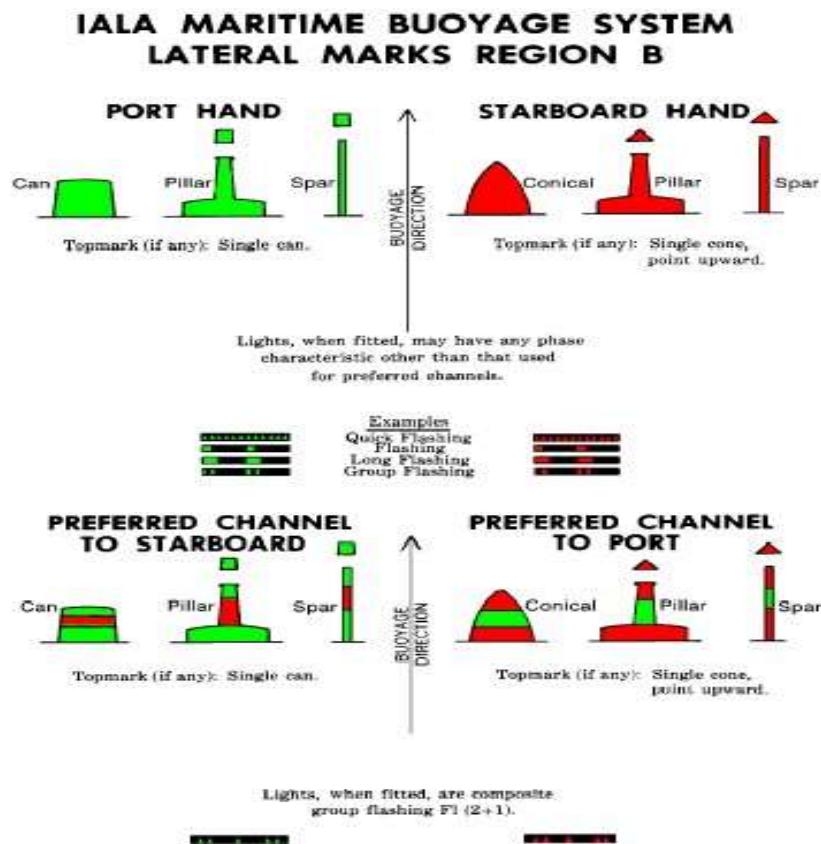


Figure 20-1 – IALA lateral buoys – Characteristics

Remarks:

- If it is required to encode a buoy or topmark that has more than one colour, the attributes colour and colour pattern must be encoded, according to the rules laid out in clause 2.4.10.
- If it is required to encode the total vertical length, including the topmark and any equipment features (for example light), of the buoy above the water level, it must be done using the attribute vertical length.

Distinction: Cardinal Buoy; Emergency Wreck Marking Buoy; Installation Buoy; Isolated Danger Buoy; Mooring Buoy; Safe Water Buoy; Special Purpose/General Buoy.

Inland specific Encoding Instructions:

- A EUR: The designator as it appears on the buoy, if it can be read from a passing vessel, should be encoded in the attribute **feature name** (OBJNAM). Administrative information on the buoys that is not relevant for navigation should be encoded in the attribute **information**. It is not repeated for each equipment feature.
- B) EUR: For buoys with **marks navigational – system of** (MARSYS) = 11 in case the complex attribute **top mark** (TOPMAR) is added:
topmark/daymark shape (TOPSHP) = 5 (cylinder) for right hand side buoys
topmark/daymark shape (TOPSHP) = 1 (cone, point up) for left hand side buoys
- C) EUR: for buoys with **marks navigational – system of** (MARSYS) = 11 **buoy shape** (BOYSHP)/**category of lateral mark** (CATLAM)/**colour** (COLOUR) attributes must be used in the following combinations:
1 (conical) / 8 (left fairway side) / 4 (green)
2 (can) / 7 (right fairway side) / 3 (red)
- D) US: **buoy shape** (BOYSHP)/**category of lateral mark** (CATLAM)/**colour** (COLOUR) attributes must be used in the following combinations:
1 (conical) / 2 (starboard-hand lateral mark) / 3 (red)
2 (can) / 1 (port-hand lateral mark) / 4 (green)
- E) US: Use **information text** (INFORM) to note the river tender or vessel used to place/set buoy
- F) EUR: If not under the issuing authority, use **information text** (INFORM) to indicate responsibility of operation of the buoy.
- G) If the system of navigational marks of a special sign is different from the system mentioned in the meta feature **Navigational System of Marks** (m_nsyst), or there is no meta feature **Navigational System of Marks** (m_nsyst) feature in the cell, the attribute **marks navigational – system of** (MARSYS) has to be used.
- H) **Lateral Buoy** (BOYLAT, boylat) must act as structure feature to a **Light All Around** (LIGHTS) feature (if it exists).
- I) EUR: In the Po River, a red buoy represents an obstacle near the right bank. The buoy has to be kept on the right when navigating in the downstream direction and has to be kept on the left when navigating in the upstream direction. **Colour** (COLOUR) = [3 (red)]
- J) EUR: In the Po River, a white buoy represents an obstacle near the left bank. The buoy has to be kept on the left when navigating in the downstream direction and has to be kept on the right when navigating in the upstream direction. **Colour** (COLOUR) = [1 (white)]
- K) Buoy at bifurcation of channel
 - i) EUR: If a buoy is according to IALA with preference of channel, feature **Lateral Buoy** (BOYLAT), **category of lateral mark** (CATLAM) = 3 or 4 shall be used.
 - ii) EUR: Coding of the attribute **category of lateral mark** (CATLAM) is mandatory.
In case the complex attribute **topmark** (TOPMAR) is added:
topmark/daymark shape (TOPSHP) = 3 (sphere) and **colour** (COLOUR)/**colour pattern** (COLPAT) shall be encoded for the buoy and/or

	<p>topmark/daymark shape (TOPSHP) = 1 (cone, point up) if category of lateral mark (CATLAM) = 3 or topmark/daymark shape (TOPSHP) = 5 (cylinder) if category of lateral mark (CATLAM)= 4</p> <p>If buoy according to IALA with preference of channel, Lateral Buoy (BOYLAT), category of lateral mark (CATLAM) = 3 or 4</p> <p>iii) IALA: If there is no preference to pass Special Purpose/General Buoy (BOYSPP) with (M) category of special purpose mark (CATSPM) = 54 (channel separation mark) is used</p> <p>iv) EUR: For a buoy with marks navigational – system of (MARSYS) = 11main European inland waterway marking system, feature Lateral Buoy (boylat) with category of lateral mark (CATLAM) = 3, 4 or 8 shall be used. The colour (COLOUR) attribute shall be encoded with 3,4,3,4 (red / green)</p> <p>v) EUR: For a buoy with two topmarks, encode only the upper topmark (TOPMAR).</p>
L)	Buoy at bridge pillar
M)	<p>i) This feature must be included in a Bridge Aggregation feature.</p> <p>ii) EUR: For buoys with marks navigational – system of (MARSYS) = 11 feature Lateral Buoy (boylat) has to be used. Buoy shape (BOYSHP)/category of lateral mark (CATLAM)/colour (COLOUR) attributes must be used in the following combinations: 5 (spar) / 16 (danger point or obstacle at the left-hand side) / 1,4,1,4 (white / green) 5 (spar) / 15 (danger point or obstacle at the right-hand side) / 1,3,1,3 (white / red)</p>

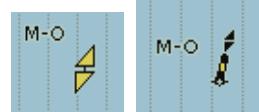
20.2 Cardinal buoy

IHO Definition: **CARDINAL BUOY**. A cardinal buoy is used in conjunction with the compass to indicate where the mariner may find the best navigable water. It is placed in one of the four quadrants (North, East, South and West), bounded by inter-cardinal bearings from the point marked. (UKHO NP 735, 5th Edition).

For IENCs a cardinal buoy is used to mark the position of danger points, obstacles and special features on lakes and broad waterways.

S-401 Geo Feature: Cardinal Buoy (BOYCAR) (M)

Primitives: Point

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
				
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
buoy shape	(BOYSHP)	1 : conical 2 : can 3 : spherical 4 : pillar 5 : spar 6 : barrel 7 : superbuoy 8 : ice buoy	EN	1,1
category of cardinal mark	(CATCAM)	1 : north cardinal mark 2 : east cardinal mark 3 : south cardinal mark 4 : west cardinal mark	EN	1,1
colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,* (ordered)
colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1 †
feature name		See clause 2.5.8	C	0,*

language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
<i>fixed date range</i>		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
marks navigational – system of	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 11 : main European inland waterway marking system	EN	0,1
<i>nature of construction</i>	(NATCON)	6 : wooden 7 : metal 8 : glass reinforced plastic 11 : latticed	EN	0,*
<i>periodic date range</i>		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
radar conspicuous	(CONRAD)		BO	0,1
<i>status</i>	(STATUS)	1 : permanent 2 : occasional 5 : periodic/intermittent 7 : temporary 8 : private 18 : existence doubtful	EN	0,*
topmark	(TOPMAR)		C	0,1
colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	(S) EN	0,* (ordered)
colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe 7 : Single Colour 8 : Rectangle 9 : Triangle	(S) EN	0,1 †

topmark/daymark shape	(TOPSHP)	1 : cone (point up) 2 : cone (point down) 3 : sphere 4 : 2 spheres 5 : cylinder 6 : board 7 : x-shaped 8 : upright cross 9 : cube (point up) 10 : 2 cones (point to point) 11 : 2 cones (base to base) 12 : rhombus 13 : 2 cones (points upward) 14 : 2 cones (points downward) 15 : besom (point up) 16 : besom (point down) 17 : flag 18 : sphere over a rhombus 19 : square 20 : rectangle (horizontal) 21 : rectangle (vertical) 22 : trapezium (up) 23 : trapezium (down) 24 : triangle (point up) 25 : triangle (point down) 26 : circle 27 : two upright crosses (one over the other) 28 : T-shape 29 : triangle pointing up over a circle 30 : upright cross over a circle 31 : rhombus over a circle 32 : circle over a triangle pointing up 33 : other shape (see shape information) 34 : tubular	(S) EN	1,1
shape information			(S) C	0,*
language		ISO 639-2/T	(S) TE	0,1
text	(INFORM) (NINFOM)		(S) TE	1,1
<i>vertical length</i>	(VERLEN)		RE	0,1
scale minimum	(SCAMIN)	[EUR: 22000, US: 60000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFOM)		(S) TE	0,1 †
<i>pictorial representation</i>	(PICREP)	See clause 2.4.12.2	TE	0,1

MMSI Code	(mmsico)	[xxxxxxxxx] (e.g., 366777490)	TE	0, 1
Reported Date	(SORDAT)		TD	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Structure	Structure/Equipment (see clause 25.12)	Daymark, Distance Mark, Fog Signal, Light All Around, Notice Mark, Physical AIS Aid to Navigation, Radar Transponder Beacon, Signal Station Traffic, Signal Station Warning	Composition	0,1

The Component	Aids to Navigation Association (see clause 25.2)	Fairway System, Traffic Separation Scheme, Two-Way Route	Association	0,*
The Component	Barrage Association (see clause 0)	Dam	Association	0,*
The Component	Lock Aggregation (see clause 25.23)	Lock Basin	Association	0,*
The Auxiliary Feature	Fairway Auxiliary (see clause 25.6)	Fairway	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] The attribute/sub-attribute **colour pattern** is mandatory for buoys/topmarks that have more than one value populated for the attribute/sub-attribute **colour**.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

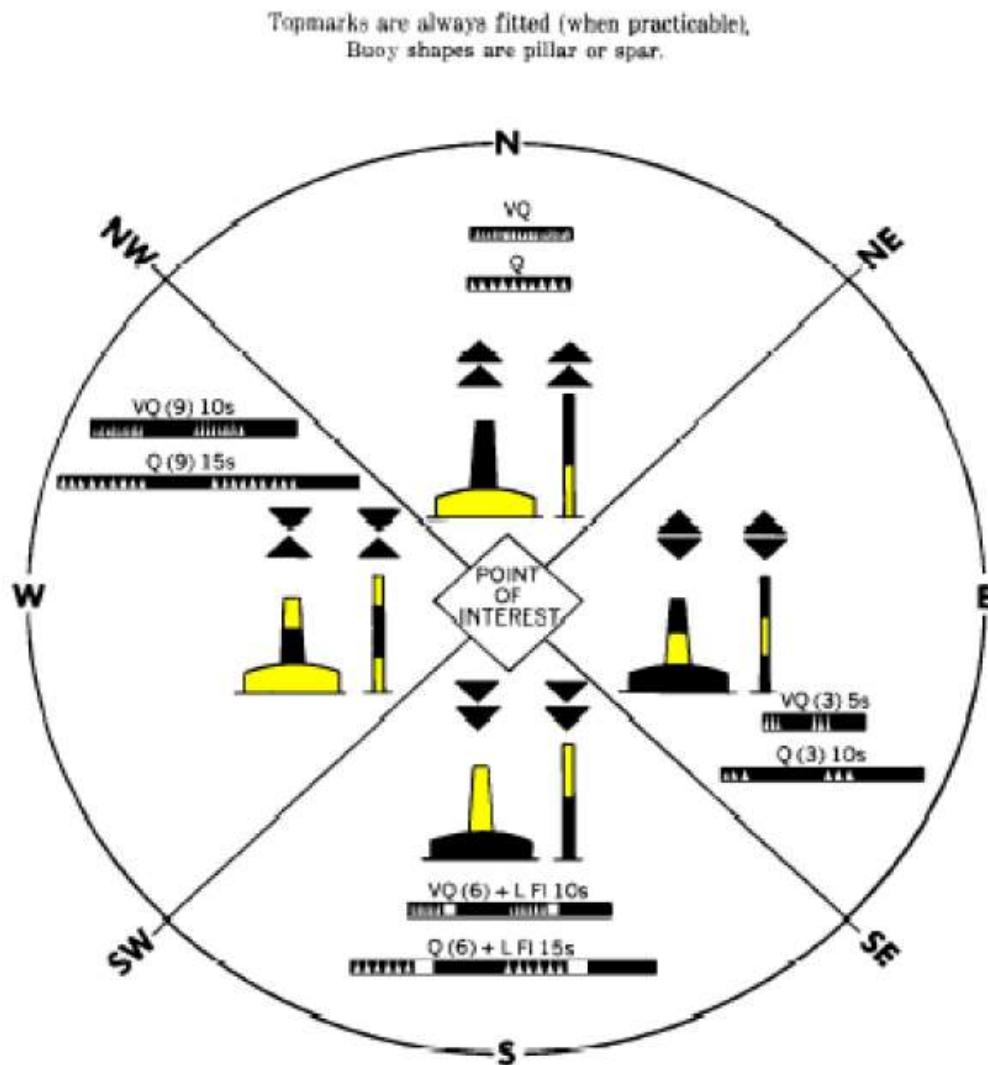
For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

20.2.1 Cardinal buoys

Cardinal marks are used in conjunction with the compass to indicate where a boatmaster may find best navigable water, taking their name from the quadrant in which they are placed in relation to the point marked. The boatmaster should pass N of a North mark, E of an East mark, etc. The shape of cardinal buoys is not significant (although they are usually pillar or spar).

To conform to the IALA Maritime Buoyage System (see clause 18.3.1.1), the body has black and yellow bands, configured with black reflecting the points of the topmark cones (for example black above yellow for north). Black double-cone topmarks are an important feature of cardinal marks and are carried wherever practicable. The points are up for a north mark, down for a south mark, apart for an east mark and together for a west mark. Lights (if fitted) are white Q or VQ, uninterrupted for the north, 3 flashes for east, 6 flashes + LFI for south and 9 flashes for west (resembling an analogue clock).

If it is required to encode a buoy having the function of a cardinal mark, it must be done using the feature **Cardinal Buoy**.



Lights, when fitted, are **white**. Very Quick Flashing or Quick Flashing; a South mark also has a Long Flash immediately following the quick flashes.

Figure 20-2 – IALA cardinal buoys – Characteristics

Remarks:

- If it is required to encode a buoy or topmark that has more than one colour, the attributes colour and colour pattern must be encoded, according to the rules laid out in clause 2.4.10.
- If it is required to encode the total vertical length, including the topmark and any equipment features (for example light), of the buoy above the water level, it must be done using the attribute vertical length.

Distinction: Emergency Wreck Marking Buoy; Installation Buoy; Isolated Danger Buoy; Lateral Buoy; Mooring Buoy; Safe Water Buoy; Special Purpose/General Buoy.

Inland specific Encoding Instructions:

- A) **Cardinal Buoy** (BOYCAR) must act as a structure feature to a **Light All Around** (LIGHTS)feature (if it exists)
- B) EUR: The designator as it appears on the buoy, if it can be read from a passing vessel, should be encoded in the attribute **feature name** (OBJNAM). Administrative information on the buoys

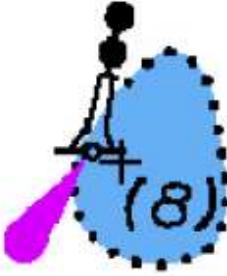
- that is not relevant for navigation should be encoded in the attribute **information**. It is not repeated for each equipment feature.
- C) If the system of navigational marks of a special sign is different from the system mentioned in the meta feature **Navigational System of Marks**, or there is no meta feature **Navigational System of Marks** in the cell, the attribute **marks navigational – system of** (MARSYS) or **information text** (INFORM) must be used.

20.3 Isolated danger buoy

IHO Definition: **ISOLATED DANGER BUOY**. An isolated danger buoy is a buoy moored on or above an isolated danger of limited extent, which has navigable water all around it. (UKHO NP 735, 5th Edition).

S-401 Geo Feature: Isolated Danger Buoy (BOYISD) (M)

Primitives: Point

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
				
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
buoy shape	(BOYSHP)	1 : conical 2 : can 3 : spherical 4 : pillar 5 : spar 6 : barrel 7 : superbuoy 8 : ice buoy	EN	1,1
colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,* (ordered)
colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1 [†]
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1

<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
<i>fixed date range</i>		See clause 2.4.8	C	0,1
<i>date end</i>	(DATEND)		(S) TD	0,1 [†]
<i>date start</i>	(DATSTA)		(S) TD	0,1 [†]
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,2
<i>marks navigational – system of</i>	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 10 : other system 11 : main European inland waterway marking system 12 : Russian inland waterway regulations 13 : Brazilian national inland waterway regulation 15 : Paraguay-Parana waterway - Brazilian complementary aids	EN	0,1
<i>nature of construction</i>	(NATCON)	6 : wooden 7 : metal 8 : glass reinforced plastic 11 : latticed	EN	0,*
<i>periodic date range</i>		See clause 2.4.8	C	0,*
<i>date end</i>	(PEREND)		(S) TD	1,1
<i>date start</i>	(PERSTA)		(S) TD	1,1
<i>radar conspicuous</i>	(CONRAD)		BO	0,1
<i>status</i>	(STATUS)	1 : permanent 2 : occasional 5 : periodic/intermittent 7 : temporary 8 : private 18 : existence doubtful	EN	0,*
<i>topmark</i>	(TOPMAR)		C	0,1
<i>colour</i>	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	(S) EN	0,* (ordered)
<i>colour pattern</i>	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe 7 : Single Colour	(S) EN	0,1 [†]

		8 : Rectangle 9 : Triangle		
topmark/daymark shape	(TOPSHP)	1 : cone (point up) 2 : cone (point down) 3 : sphere 4 : 2 spheres 5 : cylinder 6 : board 7 : x-shaped 8 : upright cross 9 : cube (point up) 10 : 2 cones (point to point) 11 : 2 cones (base to base) 12 : rhombus 13 : 2 cones (points upward) 14 : 2 cones (points downward) 15 : besom (point up) 16 : besom (point down) 17 : flag 18 : sphere over a rhombus 19 : square 20 : rectangle (horizontal) 21 : rectangle (vertical) 22 : trapezium (up) 23 : trapezium (down) 24 : triangle (point up) 25 : triangle (point down) 26 : circle 27 : two upright crosses (one over the other) 28 : T-shape 29 : triangle pointing up over a circle 30 : upright cross over a circle 31 : rhombus over a circle 32 : circle over a triangle pointing up 33 : other shape (see shape information) 34 : tubular	(S) EN	1,1
shape information			(S) C	0,*
language		ISO 639-2/T	(S) TE	0,1
text	(INFORM) (NINFORM)		(S) TE	1,1
vertical length	(VERLEN)		RE	0,1
scale minimum	(SCAMIN)	[BR: 50000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1

language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 [†]
pictorial representation	(PICREP)	See clause 2.4.12.2	TE	0,1
MMSI Code	(mmsico)	[xxxxxxxx] (e.g., 366777490)	TE	0, 1
Reported Date	(SORDAT)		TD	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity

The Structure	Structure/Equipment (see clause 25.12)	Daymark, Distance Mark, Fog Signal, Light All Around, Notice Mark, Physical AIS Aid to Navigation, Radar Transponder Beacon, Signal Station Traffic, Signal Station Warning	Composition	0,1
The Component	Aids to Navigation Association (see clause 25.2)	Fairway System, Traffic Separation Scheme, Two-Way Route	Association	0,*
The Auxiliary Feature	Fairway Auxiliary (see clause 25.6)	Fairway	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] The attribute/sub-attribute **colour pattern** is mandatory for buoys/topmarks that have more than one value populated for the attribute/sub-attribute **colour**.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of fixed date range, at least one of the sub-attributes date end or date start must be populated.

For each instance of information, at least one of the sub-attributes file reference or text must be populated.

20.3.1 Isolated danger buoys

Isolated danger buoys are moored above isolated dangers of limited extent with navigable water all around them.

The shape of isolated danger buoys is not significant (although they are usually pillar or spar shaped). To conform to the IALA Maritime Buoyage System (see clause 18.3.1.1), the body is black, with one or more red bands. Black double-sphere topmarks are an important feature of isolated danger buoys and carried wherever practicable. The light (if fitted) is white Fl(2).

If it is required to encode a buoy having the function of an isolated danger mark, it must be done using the feature Isolated Danger Buoy.

IALA MARITIME BUOYAGE SYSTEM REGIONS A AND B

ISOLATED DANGER MARKS

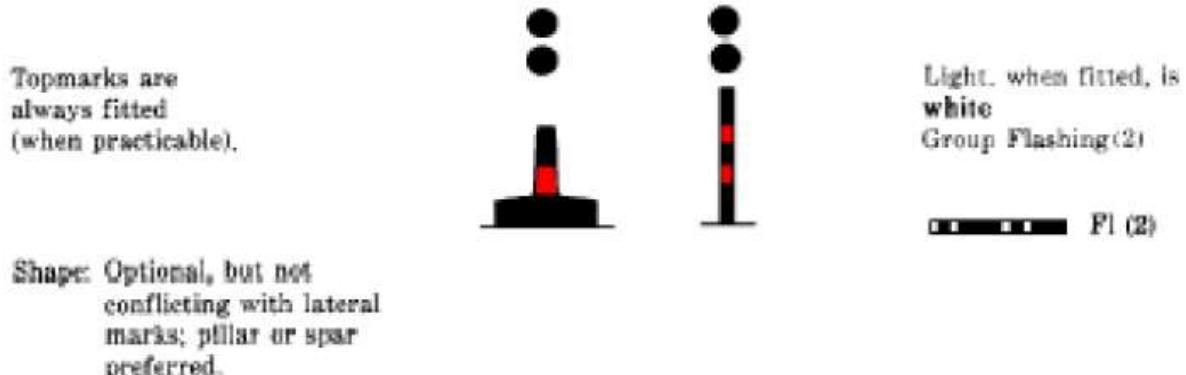


Figure 20-3 – IALA isolated danger buoys – Characteristics

Remarks:

- If it is required to encode a buoy or topmark that has more than one colour, the attributes colour and colour pattern must be encoded, according to the rules laid out in clause 2.4.10.
- If it is required to encode the total vertical length, including the topmark and any equipment features (for example light), of the buoy above the water level, it must be done using the attribute vertical length.

Distinction: Cardinal Buoy; Emergency Wreck Marking Buoy; Installation Buoy; Lateral Buoy; Mooring Buoy; Safe Water Buoy; Special Purpose/General Buoy.

Inland specific Encoding Instructions:

- A) **Isolated Danger Buoy** (BOYISD) must act as a structure feature to a **Light All Around** (LIGHTS) feature (if it exists).
- B) If there is any complementary characteristic on the buoy body or top mark, it should be described in the attribute **information text** (INFORM).
- C) In the event there is a light on the buoy, the **Isolated Danger Buoy** (BOYISD) feature should be designated as the structure and coded with the name of the light.
- D) BR: The Brazilian national number of the buoy (if it exists) should be encoded in the attribute INFORM or in a PICREP presentation.

20.4 Safe water buoy

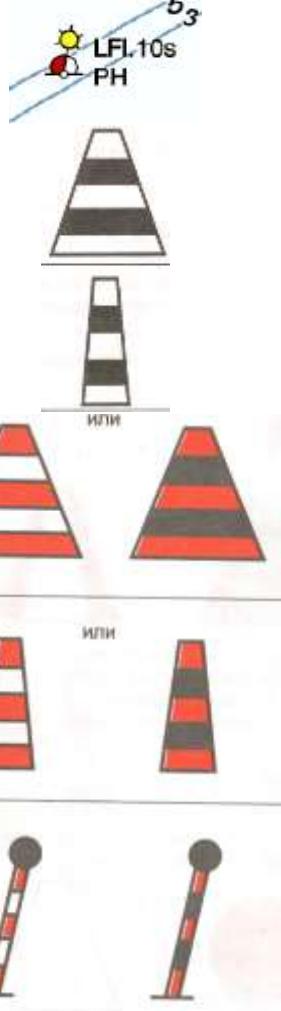
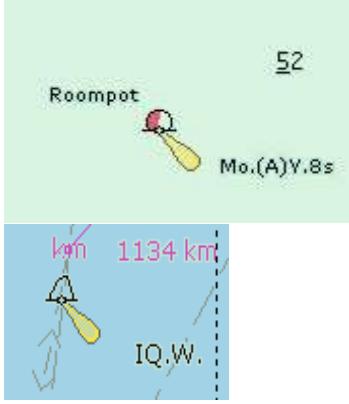
IHO Definition: **SAFE WATER BUOY.** A safe water buoy is used to indicate that there is navigable water around the mark. (UKHO NP 735, 5th Edition).

For IENCs a safe water buoy marking the axis or middle of a channel may be used as a centerline, mid-channel on lakes and broad waterways.

The swinging axial buoys are used to mark swinging points of the fairway axis.

S-401 Geo Feature: Safe Water Buoy (BOYSAW) (M)

Primitives: Point

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol
		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value
buoy shape	(BOYSHP)	1 : conical 2 : can 3 : spherical 4 : pillar 5 : spar 6 : barrel 7 : superbuoy 8 : ice buoy

colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,* (ordered)
colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1 †
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
<i>fixed date range</i>		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
marks navigational – system of	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 10 : other system 11 : main European inland waterway marking system 12 : Russian inland waterway regulations 13 : Brazilian national inland waterway regulation 15 : Paraguay-Parana waterway - Brazilian complementary aids	EN	0,1
<i>nature of construction</i>	(NATCON)	6 : wooden 7 : metal 8 : glass reinforced plastic 11 : latticed	EN	0,*
<i>periodic date range</i>		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
radar conspicuous	(CONRAD)		BO	0,1

<i>status</i>	(STATUS)	1 : permanent 2 : occasional 5 : periodic/intermittent 7 : temporary 8 : private 18 : existence doubtful	EN	0,*
topmark	(TOPMAR)		C	0,1
colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	(S) EN	0,* (ordered)
colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe 7 : Single Colour 8 : Rectangle 9 : Triangle	(S) EN	0,1 †
topmark/daymark shape	(TOPSHP)	1 : cone (point up) 2 : cone (point down) 3 : sphere 4 : 2 spheres 5 : cylinder 6 : board 7 : x-shaped 8 : upright cross 9 : cube (point up) 10 : 2 cones (point to point) 11 : 2 cones (base to base) 12 : rhombus 13 : 2 cones (points upward) 14 : 2 cones (points downward) 15 : besom (point up) 16 : besom (point down) 17 : flag 18 : sphere over a rhombus 19 : square 20 : rectangle (horizontal) 21 : rectangle (vertical) 22 : trapezium (up) 23 : trapezium (down) 24 : triangle (point up) 25 : triangle (point down) 26 : circle 27 : two upright crosses (one over the other) 28 : T-shape 29 : triangle pointing up over a circle 30 : upright cross over a circle	(S) EN	1,1

		31 : rhombus over a circle 32 : circle over a triangle pointing up 33 : other shape (see shape information) 34 : tubular		
shape information			(S) C	0,*
language		ISO 639-2/T	(S) TE	0,1
text	(INFORM) (NINFORM)		(S) TE	1,1
<i>vertical length</i>	(VERLEN)		RE	0,1
scale minimum	(SCAMIN)	[EUR: 22000, US: 60000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
<i>pictorial representation</i>	(PICREP)	See clause 2.4.12.2	TE	0,1
MMSI Code	(mmsico)	[xxxxxxxx] (e.g., 366777490)	TE	0, 1
Reported Date	(SORDAT)		TD	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports	(S) EN	0, 1

		10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data		
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Structure	Structure/Equipment (see clause 25.12)	Daymark, Distance Mark, Fog Signal, Light All Around, Notice Mark, Physical AIS Aid to Navigation, Radar Transponder Beacon, Signal Station Traffic, Signal Station Warning	Composition	0,1
The Component	Aids to Navigation Association (see clause 25.2)	Fairway System, Traffic Separation Scheme, Two-Way Route	Association	0,*
The Auxiliary Feature	Fairway Auxiliary (see clause 25.625.6)	Fairway	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

† The attribute/sub-attribute **colour pattern** is mandatory for buoys/topmarks that have more than one value populated for the attribute/sub-attribute **colour**.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

20.4.1 Safe water buoys

Safe water marks are used to indicate there is safe water all around the mark. It may be used as a centre-line, mid-channel or landfall buoy, or to mark the best point of passage under a bridge.

To conform to the IALA Maritime Buoyage System (see clause 18.3.1.1), the shape of a safe water buoy is spherical, pillar or spar. The body of the mark has red and white vertical stripes. If the shape of the buoy is not spherical a red spherical topmark is carried wherever practicable. The light (if fitted) is white Oc, Iso, LFl or Mo(A) with a period of 10s.

If it is required to encode a buoy having the function of a safe water mark, it must be done using the feature **Safe Water Buoy**.

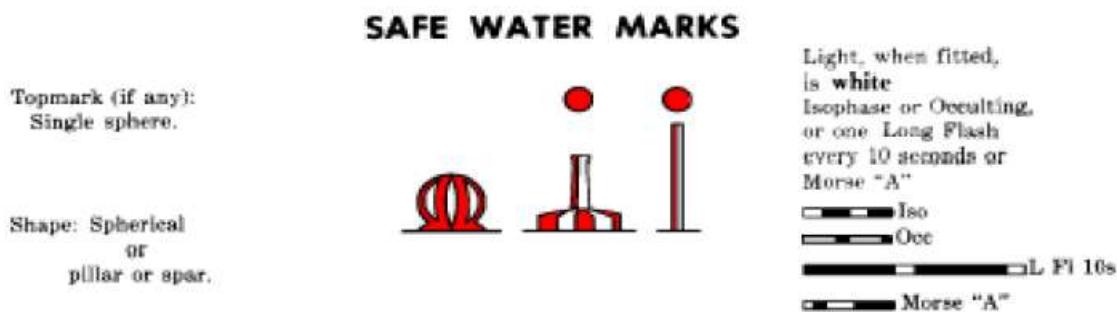


Figure 20-4 – IALA safe water buoys – Characteristics

Remarks:

- If it is required to encode a buoy or topmark that has more than one colour, the attributes colour and colour pattern must be encoded, according to the rules laid out in clause 2.4.10.
- If it is required to encode the total vertical length, including the topmark and any equipment features (for example light), of the buoy above the water level, it must be done using the attribute vertical length.

Distinction: Cardinal Buoy; Emergency Wreck Marking Buoy; Installation Buoy; Isolated Danger Buoy; Lateral Buoy; Mooring Buoy; Special Purpose/General Buoy.

Inland specific Encoding Instructions:

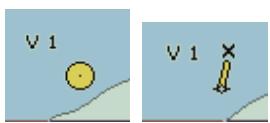
- A) EUR: The designator as it appears on the buoy, if it can be read from a passing vessel, should be encoded in the attribute **feature name** (OBJNAM). Administrative information on the buoys that is not relevant for navigation should be encoded in the attribute **information** (INFORM). It is not repeated for each equipment feature.
- B) In case the complex attribute **topmark** (TOPMAR) is added: **topmark/daymark shape** (TOPSHP) = 3 (sphere) and **colour** (COLOUR) = (3 (red)).
- C) If the system of navigational marks of a special sign is different from the system mentioned in the metadata feature **Navigational System of Marks** (m_nsyst), or there is no metadata feature **Navigational System of Marks** in the cell, the attribute **marks navigational – system of** (MARSYS) must be used.

20.5 Special purpose/general buoy

IHO Definition: **SPECIAL PURPOSE/GENERAL BUOY.** A special purpose buoy is primarily used to indicate an area or feature, the nature of which is apparent from reference to a chart, Sailing Directions or Notices to Mariners. (UKHO NP 735, 5th Edition).
For IENCs also buoys to indicate the presence of potentially dangerous obstructions such as groins, banks, or wrecks, buoys to be used as initial marking of a dangerous wreck and supporting pontoons of swinging wire ferries

S-401 Geo Feature: Special Purpose/General Buoy (BOYSPP) (M)

Primitives: Point

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
 Special Purpose Buoy IALA	 Special Purpose Buoy IALA	 Special Purpose Buoy IALA		
 Buoy marking danger point	 Buoy marking danger point (EUR)	 Buoy marking danger point (RF)		
 Supporting pontoons of a swinging wire ferry				
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity

buoy shape	(BOYSHP)	1 : conical 2 : can 3 : spherical 4 : pillar 5 : spar 6 : barrel 7 : superbuoy 8 : ice buoy	EN	1,1
category of special purpose mark	(CATSPM)	1 : firing danger area mark 2 : target mark 3 : marker ship mark 4 : degaussing range mark 5 : barge mark 6 : cable mark 7 : spoil ground mark 8 : outfall mark 9 : ODAS 10 : recording mark 11 : seaplane anchorage mark 12 : recreation zone mark 13 : private mark 14 : mooring mark 15 : LANBY 16 : leading mark 17 : measured distance mark 18 : notice mark 19 : TSS mark (Traffic Separation Scheme) 20 : anchoring prohibited mark 21 : berthing prohibited mark 22 : overtaking prohibited mark 23 : two-way traffic prohibited mark 24 : reduced wake mark 25 : speed limit mark 26 : stop mark 27 : general warning mark 28 : sound ship's siren mark 29 : restricted vertical clearance mark 30 : maximum vessel's draught mark 31 : restricted horizontal clearance mark 32 : strong current warning mark 33 : berthing permitted mark 34 : overhead power cable mark 35 : channel edge gradient mark 36 : telephone mark 37 : ferry crossing mark 39 : pipeline mark 40 : anchorage mark 41 : clearing mark 42 : control mark 43 : diving mark	EN	1,*

		44 : refuge beacon 45 : foul ground mark 46 : yachting mark 47 : heliport mark 48 : GNSS mark 49 : seaplane landing mark 50 : entry prohibited mark 51 : work in progress mark 52 : mark with unknown purpose 53 : wellhead mark 54 : channel separation mark 55 : marine farm mark 56 : artificial reef mark 57 : ice mark 58 : nature reserve mark 59 : fish aggregating device 60 : wreck mark 61 : customs mark 62 : causeway mark 63 : wave recorder		
colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,* (ordered)
colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1 †
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
interoperability identifier		MRN (see clause 27.161)	URN	0,1
marks navigational – system of	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 10 : other system	EN	0,1

		11 : main European inland waterway marking system 12 : Russian inland waterway regulations 13 : Brazilian national inland waterway regulation 15 : Paraguay-Parana waterway - Brazilian complementary aids		
<i>nature of construction</i>	(NATCON)	6 : wooden 7 : metal 8 : glass reinforced plastic 11 : latticed	EN	0,*
<i>periodic date range</i>		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
radar conspicuous	(CONRAD)		BO	0,1
<i>status</i>	(STATUS)	1 : permanent 2 : occasional 5 : periodic/intermittent 7 : temporary 8 : private 18 : existence doubtful	EN	0,*
topmark	(TOPMAR)		C	0,1
colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	(S) EN	0,* (ordered)
colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe 7 : Single Colour 8 : Rectangle 9 : Triangle	(S) EN	0,1 †
topmark/daymark shape	(TOPSHP)	1 : cone (point up) 2 : cone (point down) 3 : sphere 4 : 2 spheres 5 : cylinder 6 : board 7 : x-shaped 8 : upright cross 9 : cube (point up) 10 : 2 cones (point to point) 11 : 2 cones (base to base)	(S) EN	1,1

		12 : rhombus 13 : 2 cones (points upward) 14 : 2 cones (points downward) 15 : besom (point up) 16 : besom (point down) 17 : flag 18 : sphere over a rhombus 19 : square 20 : rectangle (horizontal) 21 : rectangle (vertical) 22 : trapezium (up) 23 : trapezium (down) 24 : triangle (point up) 25 : triangle (point down) 26 : circle 27 : two upright crosses (one over the other) 28 : T-shape 29 : triangle pointing up over a circle 30 : upright cross over a circle 31 : rhombus over a circle 32 : circle over a triangle pointing up 33 : other shape (see shape information) 34 : tubular		
shape information			(S) C	0,*
language		ISO 639-2/T	(S) TE	0,1
text	(INFORM) (NINFOM)		(S) TE	1,1
<i>vertical length</i>	(VERLEN)		RE	0,1
scale minimum	(SCAMIN)	[EUR: 22000, US: 60000; For supporting pontoons of swinging wire ferries: 45000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFOM)		(S) TE	0,1 †
<i>pictorial representation</i>	(PICREP)	See clause 2.4.12.2	TE	0,1
MMSI Code	(mmsico)	[xxxxxxxx] (e.g., 366777490)	TE	0, 1
Type Of AtoN	(typatn)	1 : Aid to Navigation 2 : Physical AIS Aid to Navigation 3 : Virtual AIS Aid to Navigation	EN	0, 1

Reported Date	(SORDAT)		TD	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Structure	Structure/Equipment (see clause 25.12)	Daymark, Distance Mark, Fog Signal, Light All Around, Notice Mark, Physical AIS Aid to Navigation, Radar Transponder Beacon, Signal Station Traffic, Signal Station Warning	Composition	0,1
The Component	Aids to Navigation Association (see clause 25.2)	Fairway System, Traffic Separation Scheme, Two-Way Route	Association	0,*

The Component	Barrage Association (see clause 0)	Dam	Association	0,*
The Component	Lock Aggregation (see clause 25.23)	Lock Basin	Association	0,*
The Auxiliary Feature	Fairway Auxiliary (see clause 25.6)	Fairway	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Association	0,*
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] The attribute/sub-attribute **colour pattern** is mandatory for buoys/topmarks that have more than one value populated for the attribute/sub-attribute **colour**.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

20.5.1 Special purpose/general buoys

Special marks are used to indicate to the boatmaster a special area or feature, the nature of which is usually apparent from the IENC, paper chart or associated publication. Special marks may also be used to mark a channel within a channel, using yellow buoys of the appropriate lateral shape, or yellow spherical buoys to mark the centreline. A special buoy may be any shape but must not conflict with lateral or safe water marks (for example an outfall buoy on the port-side of a channel could be conical but should not be conical).

To conform to the IALA Maritime Buoyage System (see clause 18.3.1.1), the body of the buoy is yellow. The topmark (if fitted) is a yellow diagonal 'X' (St Andrew's cross). Lights (if fitted) are yellow and of any rhythm except those used for cardinal, isolated danger and safe water marks.

If it is required to encode a buoy having the function of a special purpose mark, or a buoy whose appearance or purpose is inadequately known, it must be done using the feature **Special Purpose/General Buoy**.

In the following Table, a blank indicates that the encoder may choose a relevant value for the attribute. The Table contains the most common examples of coding in maritime ENCs; other coding combinations are possible for **Special Purpose/General Buoy** features.

Feature	Feature	buoy shape	category of special purpose mark	Other attributes
Firing danger area buoy	Special Purpose/General Buoy		1	
Target	Special Purpose/General Buoy		2	

Marker ship	Special Purpose/General Buoy		3	
Barge	Special Purpose/General Buoy		5	
Degaussing range buoy	Special Purpose/General Buoy		4	
Buoy marking cable	Special Purpose/General Buoy		6	
Spoil ground buoy	Special Purpose/General Buoy		7	
Buoy marking outfall	Special Purpose/General Buoy		8	
Buoy marking pipeline	Special Purpose/General Buoy		39	
Superbuoy	*** Buoy	7		
Large automatic navigational buoy	Special Purpose/General Buoy	7	15	
Ocean data acquisition system (ODAS) buoy	Special Purpose/General Buoy		9	Subsurface ODAS encoded as Obstruction (see clause 13.6)
Seaplane anchorage buoy	Special Purpose/General Buoy		11	
Buoy marking traffic separation scheme	Special Purpose/General Buoy		19	
Buoy marking recreation zone	Special Purpose/General Buoy		12	
Floating waste bin	Special Purpose/General Buoy		<i>Empty (null) value</i>	information = waste bin (for example)
Fish Aggregating Device (FAD)	Special Purpose/General Buoy	/	59	Fish havens are encoded as Obstruction (see clause 13.6)
Buoy marking wave recorder (or current meter)	Special Purpose/General Buoy		63	

*Table 20-1 – IALA special purpose buoys – Common types*Remarks:

If it is required to encode a buoy or topmark that has more than one colour, the attributes **colour** and **colour pattern** must be encoded, according to the rules laid out in clause 2.4.10.

If it is required to encode the total vertical length, including the topmark and any equipment features (for example light), of the buoy above the water level, it must be done using the attribute **vertical length**.

If a special purpose buoy does not conform to the system of navigational marks defined by **Navigational System of Marks** (see clause 3.6), the attribute **marks navigational – system of** on the **Special Purpose/General Buoy** should be populated as 9 (no system).

Fish havens (sometimes referred to as subsurface Fish Aggregating Devices (FAD)) and subsurface Ocean Data Acquisition System (ODAS) equipment must be encoded, where required, using an **Obstruction** feature (see clause 13.6).

A buoy deployed as an emergency measure to mark a newly identified danger, such as a wreck, must be encoded using the feature **Emergency Wreck Marking Buoy** (see clause 20.6). A special purpose buoy intended to permanently mark a wreck as a danger must be encoded, where required, as a **Special Purpose/General Buoy** feature, with attribute **category of special purpose mark** = 60 (wreck mark).

Distinction: Cardinal Buoy; Emergency Wreck Marking Buoy; Installation Buoy; Isolated Danger Buoy; Lateral Buoy; Mooring Buoy; Safe Water Buoy.

Inland specific Encoding Instructions:

- A) EUR: The designator as it appears on the buoy, if it can be read from a passing vessel, should be encoded in the attribute **feature name** (OBJNAM). Administrative information on the buoys that is not relevant for navigation should be encoded in the attribute **information**. It is not repeated for each equipment feature.
- B) If the system of navigational marks of a special sign is different from the system mentioned in the metadata feature **Navigational System of Marks** (m_nsys), or there is no **Navigational System of Marks** (m_nsys) metadata feature in the cell, the attribute **marks navigational – system of** (MARSYS), must be used.
- C) Buoy marking danger point
 - i) EUR: If buoys according to main European inland waterway marking system are used feature **Lateral Buoy** (boylat) has to be used.
 - ii) US: Use **information text** (INFORM) to note the river tender or vessel used to place/set buoy
 - iii) EUR: If not under the issuing authority, use **information text** (INFORM) to indicate responsibility of operation of the buoy.
- D) Emergency Wreck Marking Buoy
 - i) If it is required to encode an emergency wreck marking buoy, it must be done using the feature **Emergency Wreck Marking Buoy** (clause 20.6). Only if a general buoy is used to mark a wreck a **Special Purpose/General Buoy** (BOYSPP) feature has to be encoded. In this case ii) and iii) are applicable.
 - ii) **Special Purpose/General Buoy** (BOYSPP) is encoded as structure feature to the light feature and the radar transponder beacon feature.
 - iii) EUR: The designator as it appears on the buoy, if it can be read from a passing vessel, should be encoded in the attribute OBJNAM. Administrative information on the buoys that is not relevant for navigation should be encoded in the attribute **information**. It is not repeated for each equipment feature.
- E) For buoys at bifurcation of the channel according to IALA: If there is no preference to pass **Special Purpose/General Buoy** (BOYSPP) with **category of special purpose mark** (CATSPM) = 54 (channel separation mark) is used
- F) For supporting pontoons of swinging wire ferries use **Special Purpose/General Buoy** (BOYSPP) with **category of special purpose mark** (CATSPM) =37 (ferry crossing mark).

20.6 Emergency wreck marking buoy

IHO Definition: **EMERGENCY WRECK MARKING BUOY.** An emergency wreck marking buoy is a buoy moored on or above a new wreck, designed to provide a prominent (both visual and radio) and easily identifiable temporary first response. (Adapted from UKHO NP 735, 6th Edition).

S-401 Geo Feature: Emergency Wreck Marking Buoy (M)

Primitives: Point

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
				
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
buoy shape	(BOYSHP)	1 : conical 2 : can 3 : spherical 4 : pillar 5 : spar 6 : barrel 7 : superbuoy 8 : ice buoy	EN	1,1
colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,* (ordered)
colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1 [†]
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1

<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 †
<i>fixed date range</i>		See clause 2.4.8	C	0,1
<i>date end</i>	(DATEND)		(S) TD	0,1 †
<i>date start</i>	(DATSTA)		(S) TD	0,1 †
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
marks navigational – system of	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 10 : other system 11 : main European inland waterway marking system 12 : Russian inland waterway regulations 13 : Brazilian national inland waterway regulation 15 : Paraguay-Parana waterway - Brazilian complementary aids	EN	0,1
<i>nature of construction</i>	(NATCON)	6 : wooden 7 : metal 8 : glass reinforced plastic 11 : latticed	EN	0,*
radar conspicuous	(CONRAD)		BO	0,1
topmark	(TOPMAR)		C	0,1
colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	(S) EN	0,* (ordered)
colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe 7 : Single Colour 8 : Rectangle 9 : Triangle	(S) EN	0,1 †
topmark/daymark shape	(TOPSHP)	1 : cone (point up) 2 : cone (point down) 3 : sphere 4 : 2 spheres 5 : cylinder 6 : board 7 : x-shaped 8 : upright cross 9 : cube (point up) 10 : 2 cones (point to point)	(S) EN	1,1

		11 : 2 cones (base to base) 12 : rhombus 13 : 2 cones (points upward) 14 : 2 cones (points downward) 15 : besom (point up) 16 : besom (point down) 17 : flag 18 : sphere over a rhombus 19 : square 20 : rectangle (horizontal) 21 : rectangle (vertical) 22 : trapezium (up) 23 : trapezium (down) 24 : triangle (point up) 25 : triangle (point down) 26 : circle 27 : two upright crosses (one over the other) 28 : T-shape 29 : triangle pointing up over a circle 30 : upright cross over a circle 31 : rhombus over a circle 32 : circle over a triangle pointing up 33 : other shape (see shape information) 34 : tubular		
shape information			(S) C	0,*
language		ISO 639-2/T	(S) TE	0,1
text	(INFORM) (NINFORM)		(S) TE	1,1
<i>vertical length</i>	(VERLEN)		RE	0,1
scale minimum	(SCAMIN)	[EUR: 45000, US: 60000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
<i>pictorial representation</i>	(PICREP)	See clause 2.4.12.2	TE	0,1
MMSI Code	(mmsico)	[xxxxxxxx] (e.g., 366777490)	TE	0, 1
Type Of AtoN	(typatn)	1 : Aid to Navigation 2 : Physical AIS Aid to Navigation 3 : Virtual AIS Aid to Navigation	EN	0, 1
Reported Date	(SORDAT)		TD	0, 1
Source Indication			C	0, 1

<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
<i>.....Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
<i>.....Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Structure	Structure/Equipment (see clause 25.12)	Daymark, Distance Mark, Fog Signal, Light All Around, Notice Mark, Physical AIS Aid to Navigation, Radar Transponder Beacon, Signal Station Traffic, Signal Station Warning	Composition	0,1
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*

-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*
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[†] The attribute/sub-attribute **colour pattern** is mandatory for buoys/topmarks that have more than one value populated for the attribute/sub-attribute **colour**.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

20.6.1 Emergency wreck marking buoys

Emergency wreck marking buoys are used to mark new wrecks until a permanent form of marking has been established and the wreck itself has been promulgated by Notice to Mariners, or removed.

To conform to the IALA Maritime Buoyage System (see clause 18.3.1.1), the shape of an emergency wreck marking buoy is pillar or spar. The body of the mark has blue and yellow vertical stripes. The topmark (if fitted) is a standing/upright yellow '+' (St. George's cross). Lights (if fitted) are Al.Oc.BuY.3s. If it is required to encode a buoy having the function of an emergency wreck mark, it must be done using the feature **Emergency Wreck Marking Buoy**.

Remarks:

- If it is required to encode a buoy or topmark that has more than one colour, the attributes **colour** and **colour pattern** must be encoded, according to the rules laid out in clause 2.4.10.
- If it is required to encode the total vertical length, including the topmark and any equipment features (for example light), of the buoy above the water level, it must be done using the attribute **vertical length**.
- An IALA compliant emergency wreck marking buoy topmark should be populated using the complex attribute **topmark**, with sub-attributes **topmark shape** = 8 (upright cross) and **colour** = 6 (yellow).
- An IALA compliant emergency wreck marking buoy should also have the following associated equipment features:
 - A **Light All Around** feature (see clause 19.2), with attributes **colour** = 5,6 (blue, yellow), **light characteristic** = 17 (occulting alternating), **signal group** = (1) and **signal period** = 3. The complex attribute **signal sequence**, sub-attributes **signal duration** and **signal status**, should be populated equivalent to (00.50)+01.00+(00.50)+01.00 (bracketed values corresponding to periods of eclipse and non-bracketed values corresponding to periods of light); and the attribute **value of nominal range** should be populated as 4.
 - A **Radar Transponder Beacon** feature (see clause 21.4), with attributes **category of radar transponder beacon** = 2 (racon, radar transponder beacon) and **signal group** = (D).

Distinction: Cardinal Buoy; Installation Buoy; Lateral Buoy; Mooring Buoy; Safe Water Buoy; Special Purpose/General Buoy.

Inland specific Encoding Instructions:

- A) **Emergency Wreck Marking Buoy** is encoded as structure feature to the light feature and the radar transponder beacon feature.
- B) EU: The designator as it appears on the buoy, if it can be read from a passing vessel, should be encoded in the attribute **feature name** (OBJNAM).
Administrative information on the buoys that is not relevant for navigation should be encoded in the attribute **information**. It is not repeated for each equipment feature.

20.7 Installation buoy

IHO Definition: INSTALLATION BUOY. An installation buoy is a buoy used for loading tankers with gas or oil. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.20, November 2000).				
S-401 Geo Feature: Installation Buoy (BOYINB) (M)				
Primitives: Point				
<i>Real World</i>		<i>Paper Chart Symbol</i>		<i>Inland ECDIS or ECS Symbol</i>
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
buoy shape	(BOYSHP)	1 : conical 2 : can 3 : spherical 4 : pillar 5 : spar 6 : barrel 7 : superbuoy 8 : ice buoy	EN	1,1
category of installation buoy	(CATINB)	1 : catenary anchor leg mooring 2 : single buoy mooring	EN	0,1
colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,* (ordered)
colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1 [†]
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
fixed date range		See clause 2.4.8	C	0,1

date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>nature of construction</i>	(NATCON)	7 : metal 11 : latticed	EN	0,*
<i>periodic date range</i>		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
product	(PRODCT)	1 : oil 2 : gas 18 : liquefied natural gas 19 : liquefied petroleum gas	EN	0,*
radar conspicuous	(CONRAD)		BO	0,1
<i>status</i>	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 18 : existence doubtful	EN	0,*
visual prominence	(CONVIS)	1 : visually conspicuous 2 : not visually conspicuous 3 : prominent	EN	0,1
scale minimum	(SCAMIN)	[EUR: 22000, US: 45000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
<i>pictorial representation</i>	(PICREP)	See clause 2.4.12.2	TE	0,1
Reported Date	(SORDAT)		TD	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural	(S) EN	0, 1

		9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Structure	Structure/Equipment (see clause 25.12)	Daymark, Distance Mark, Fog Signal, Light All Around, Notice Mark, Physical AIS Aid to Navigation, Radar Transponder Beacon, Signal Station Traffic, Signal Station Warning	Composition	0,1
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] The attribute **colour pattern** is mandatory for buoys that have more than one value populated for the attribute **colour**.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

20.7.1 Installation buoys

Although the oil and gas from some fields are sent ashore by submarine pipeline, a variety of mooring systems have been developed for use in deep water and in the vicinity of certain ports, to allow the loading of large vessels and the permanent mooring of floating storage vessels or units. These offshore systems include large mooring buoys, designed for mooring vessels up to 500,000 tonnes, and platforms on structures fixed at their lower ends to the seafloor. They allow a vessel to moor forward or aft to them, and to swing to the wind or stream, and are termed installation buoys.

If it is required to encode an installation buoy, it must be done using the feature **Installation Buoy**.

Remarks:

- If it is required to encode a buoy that has more than one colour, the attributes **colour** and **colour pattern** must be encoded, according to the rules laid out in clause 2.4.10.

Distinction: Mooring Buoy; Offshore Platform; Special Purpose/General Buoy.

Inland specific Encoding Instructions:

20.8 Mooring buoy

IHO Definition: MOORING BUOY. A buoy secured to the bottom by permanent moorings with means for mooring a vessel by use of its anchor chain or mooring lines. (IHO Dictionary – S-32).				
S-401 Geo Feature: Mooring Buoy (MORFAC) (C)				
Primitives: Point				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
buoy shape	(BOYSHP)	1 : conical 2 : can 3 : spherical 4 : pillar 5 : spar 6 : barrel 7 : superbuoy 8 : ice buoy	EN	1,1
colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,* (ordered)
colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1 [†]
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]

<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>maximum permitted draught</i>	(INFORM)		RE	0,1
	(NINFOM)			
<i>maximum permitted vessel length</i>	(INFORM) (NINFOM)		RE	0,1
<i>nature of construction</i>	(NATCON)	7 : metal 8 : glass reinforced plastic 11 : latticed	EN	0,*
<i>periodic date range</i>		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
<i>status</i>	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 18 : existence doubtful	EN	0,*
<i>vertical length</i>	(VERLEN)		RE	0,1
visitors mooring	(SMCFAC)		BO	0,1
scale minimum	(SCAMIN)	[EUR: 22000, US: 30000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFOM)		(S) TE	0,1 [†]
<i>pictorial representation</i>	(PICREP)	See clause 2.4.12.2	TE	0,1
Reported Date	(SORDAT)		TD	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime	(S) EN	0, 1

		16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Structure	Structure/Equipment (see clause 25.12)	Daymark, Distance Mark, Fog Signal, Light All Around, Notice Mark, Physical AIS Aid to Navigation, Radar Transponder Beacon, Signal Station Traffic, Signal Station Warning	Composition	0,1
The Component	Anchorage Or Berth Aggregation (see clause 25.18)	Anchorage Area, Anchor Berth, Berth, Mooring Area	Association	0,*
The Component	Mooring Trot Aggregation (see clause 25.7)	Mooring Trot	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

† The attribute **colour pattern** is mandatory for buoys that have more than one value populated for the attribute **colour**.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

20.8.1 Mooring buoys

Mooring buoys must be shown on charts of appropriate scale to indicate buoys and moored vessels as possible hazards to navigation as well as, on the largest scales, to facilitate mooring operations.

If it is required to encode a mooring buoy, it must be done using the feature **Mooring Buoy**.

Remarks:

- If it is required to encode a buoy that has more than one colour, the attributes **colour** and **colour pattern** must be encoded, according to the rules laid out in clause 2.4.10.
- If it is required to encode the total vertical length, including any equipment features (for example light), of the buoy above the water level, it must be done using the attribute **vertical length**.
- If it is required to encode a visitors mooring, it must be done by populating the attribute **visitors mooring** as *True*.

Distinction: Mooring Area; Mooring Trot; Small Craft Facility; Special Purpose/General Buoy.

Inland specific Encoding Instructions:

- A) Mooring buoys have to be encoded if they are in navigable water.

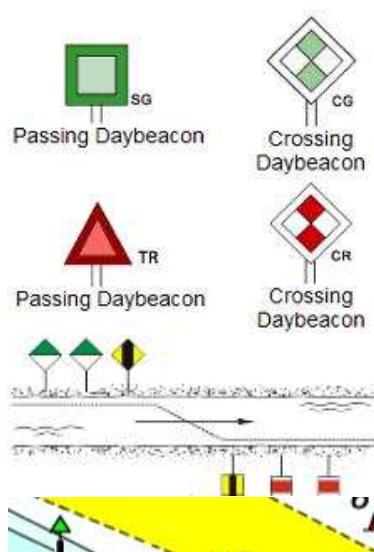
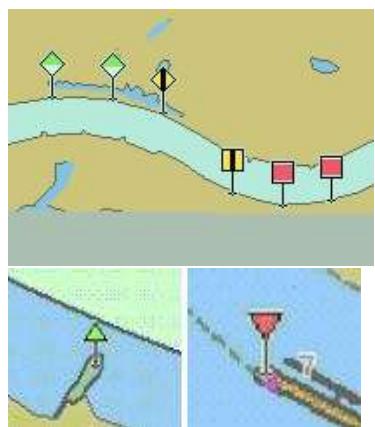
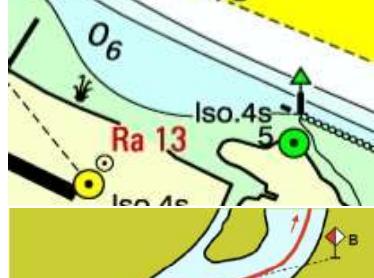
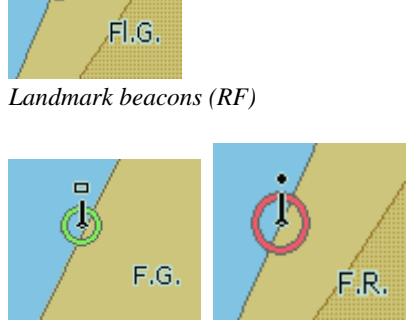
20.9 Lateral beacon

IHO Definition: LATERAL BEACON. A lateral beacon is used to indicate the port or starboard hand side of the route to be followed. They are generally used for well defined channels and are used in conjunction with a conventional direction of buoyage. (UKHO NP 735, 5th Edition).

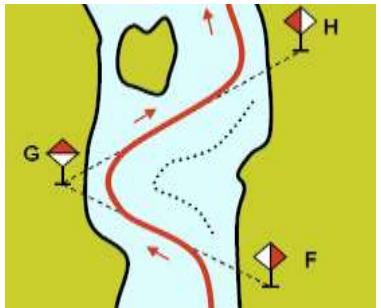
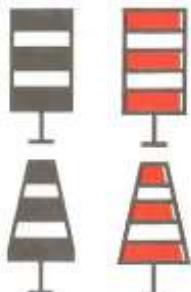
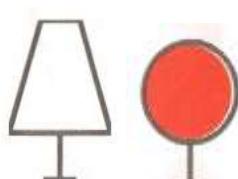
For IENCs also beacons that are used to mark specific “Landmarks” and submerged banks.

S-401 Geo Feature: Lateral Beacon (BCNLAT, bcnlat) (M)

Primitives: Point

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol
		
		

Beacons as carriers of Day Marks

	 <p><i>Beacons as carriers of Day Marks</i></p>  <p><i>Landmark beacons (RF)</i></p>  <p><i>Spring flood beacons (RF)</i></p>			
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
beacon shape	(BCNSHP)	1 : stake, pole, perch, post 2 : withy 3 : beacon tower 4 : lattice beacon 5 : pile beacon 6 : cairn 7 : buoyant beacon	EN	1,1
category of lateral mark	(CATLAM)	1 : port-hand lateral mark 2 : starboard-hand lateral mark 3 : preferred channel to starboard lateral mark 4 : preferred channel to port lateral mark 5 : Right-Hand Side of the Waterway 6 : Left-Hand Side of the Waterway 7 : Right-Hand Side of the Channel 8 : Left-Hand Side of the Channel 9 : Bifurcation of the Waterway	EN	1,1

		10 : Bifurcation of the Channel 11 : Channel Near the Right Bank 12 : Channel Near the Left Bank 13 : Channel Cross-Over to the Right Bank 14 : Channel Cross-Over to the Left Bank 15 : Danger Point or Obstacles at the Right-Hand Side 16 : Danger Point or Obstacles at the Left-Hand Side 17 : Turn Off at the Right-Hand Side 18 : Turn Off at the Left-Hand Side 19 : Junction at the Right-Hand Side 20 : Junction at the Left-Hand Side 21 : Harbour Entry at the Right-Hand Side 22 : Harbour Entry at the Left-Hand Side 23 : Bridge Pier Mark 24 : Entry From a Lake to a Narrower Waterway, Right Bank 25 : Entry From a Lake to a Narrower Waterway, Left Bank 26 : Change Bank 27 : Continue Along Bank		
colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,* (ordered)
colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1 †

condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
elevation	(ELEVAT)		RE	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
height	(HEIGHT)		RE	0,1
interoperability identifier		MRN (see clause 27.161)	URN	0,1
marks navigational – system of	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 10 : other system 11 : main European inland waterway marking system 12 : Russian inland waterway regulations 13 : Brazilian national inland waterway regulation 15 : Paraguay-Parana waterway - Brazilian complementary aids	EN	0,1
nature of construction	(NATCON)	1 : masonry 2 : concreted 6 : wooden 7 : metal 8 : glass reinforced plastic	EN	0,*
periodic date range		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
radar conspicuous	(CONRAD)		BO	0,1
reported date	(SORDAT)	See clause 2.4.8	TD	0,1

<i>status</i>	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 12 : illuminated 18 : existence doubtful	EN	0,*
topmark	(TOPMAR)		C	0,1
colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	(S) EN	0,* (ordered)
colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe 7 : Single Colour 8 : Rectangle 9 : Triangle	(S) EN	0,1 †
topmark/daymark shape	(TOPSHP)	1 : cone (point up) 2 : cone (point down) 3 : sphere 4 : 2 spheres 5 : cylinder 6 : board 7 : x-shaped 8 : upright cross 9 : cube (point up) 10 : 2 cones (point to point) 11 : 2 cones (base to base) 12 : rhombus 13 : 2 cones (points upward) 14 : 2 cones (points downward) 15 : besom (point up) 16 : besom (point down) 17 : flag 18 : sphere over a rhombus 19 : square 20 : rectangle (horizontal) 21 : rectangle (vertical) 22 : trapezium (up)	(S) EN	1,1

		23 : trapezium (down) 24 : triangle (point up) 25 : triangle (point down) 26 : circle 27 : two upright crosses (one over the other) 28 : T-shape 29 : triangle pointing up over a circle 30 : upright cross over a circle 31 : rhombus over a circle 32 : circle over a triangle pointing up 33 : other shape (see shape information) 34 : tubular		
shape information			(S) C	0,*
language		ISO 639-2/T	(S) TE	0,1
text	(INFORM) (NINFOM)		(S) TE	1,1
vertical length	(VERLEN)		RE	0,1
visual prominence	(CONVIS)	1 : visually conspicuous 2 : not visually conspicuous 3 : prominent	EN	0,1
scale minimum	(SCAMIN)	[EUR: 22000, US: 60000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFOM)		(S) TE	0,1 †
pictorial representation	(PICREP)	See clause 2.4.12.2	TE	0,1
Direction of Impact	(dirimp)	1 : Upstream 2 : Downstream 3 : To the Left Bank 4 : To the Right Bank 5 : To Harbour	EN	0, *
MMSI Code	(mmsico)	[xxxxxxxx] (e.g., 366777490)	TE	0, 1
Type Of AtoN	(typatn)	1 : Aid to Navigation 2 : Physical AIS Aid to Navigation 3 : Virtual AIS Aid to Navigation	EN	0, 1
Source Indication			C	0, 1

<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0, *
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Structure	Structure/Equipment (see clause 25.12)	Daymark, Distance Mark, Fog Signal, Light All Around, Light Sectored, Notice Mark, Physical AIS Aid to Navigation, Radar Transponder Beacon, Signal Station Traffic, Signal Station Warning	Composition	0,1

The Component	Aids to Navigation Association (see clause 25.2)	Fairway System, Traffic Separation Scheme, Two-Way Route	Association	0,*
The Auxiliary Feature	Fairway Auxiliary (see clause 25.6)	Fairway	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] The attribute/sub-attribute **colour pattern** is mandatory for beacons/topmarks that have more than one value populated for the attribute/sub-attribute **colour**.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

20.9.1 Lateral Beacons

Lateral beacons are generally used for well defined channels, in conjunction with a direction of buoyage. They indicate the port and starboard sides of the route to be followed.

To conform to the IALA Maritime Buoyage System (see clause 18.3.1.1), port hand beacons have a can shaped topmark. The colour of port hand beacons, topmarks and lights (if fitted) will be red in IALA region A and green in IALA region B.

To conform to the IALA Maritime Buoyage System, starboard hand beacons have a conical shaped topmark. The colour of starboard hand beacons, topmarks and lights (if fitted) will be green in IALA region A and red in IALA region B.

A preferred channel beacon is a modified lateral beacon, with horizontal colour bands. The predominant colour indicates which side is the preferred channel, the other colour indicates the secondary channel. If fitted, the light is Fl(2+1), the colour indicating the preferred channel.

If it is required to encode a beacon having the function of a lateral mark, it must be done using the feature **Lateral Beacon**.

IALA MARITIME BUOYAGE SYSTEM LATERAL MARKS REGION B

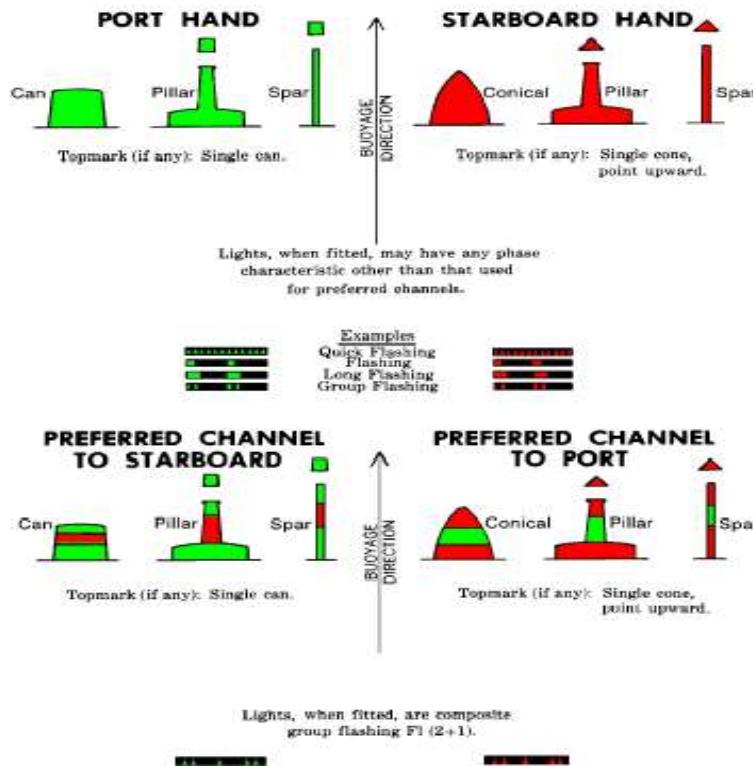


Figure 20-5 – IALA lateral beacons – Characteristics

Remarks:

- If it is required to encode a beacon or topmark that has more than one colour, the attributes **colour** and **colour pattern** must be encoded, according to the rules laid out in clause 2.4.10.
- For guidance on the encoding of the attributes **elevation**, **height** and **vertical length** see clause 2.5.7. **elevation** applies only to beacons on land. Values populated for **height** and **vertical length** must include the topmark and any equipment features.
- If it is required to encode a cairn that bears the colour(s) specified by a navigational system of marks, it must be done using a beacon feature.

Distinctions: Cardinal Beacon; Daymark; Isolated Danger Beacon; Safe Water Beacon; General Beacon.

Inland specific Encoding Instructions:

- A) **Lateral Beacon** (BCNLAT, bcnlat) must be defined as the structure feature, with **Daymark** (DAYMAR, daymar) as the equipment feature.
- B) Lateral Beacon as carrier of a Day Mark
 - i) In the event there is a light on the day mark, the **Lateral Beacon** (BCNLAT, bcnlat) feature should be designated as the structure feature and coded with the name of the light.
 - ii) EUR: The designator as it appears on the **Lateral Beacon** (BCNLAT, bcnlat), if it can be read from a passing vessel, should be encoded in the attribute **feature name** (OBJNAM). Administrative information on the beacon that is not relevant for navigation should be encoded in the attribute **information**. It is not repeated for each equipment feature.
 - iii) US: **feature name** (OBJNAM) of **Lateral Beacon** (BCNLAT, bcnlat) must be the name designated by the US Coast Guard Light List followed by the river mile, e.g., Debutte Light and Daymark (233.4). **Feature name** (OBJNAM) should not be repeated for each equipment feature.

- C) Change Bank (Used only in the Po river (Italy))
- i) 'Change bank' marks are used in pairs (two equal marks, one on each bank); the alignment of the two marks indicates the track to be followed for crossing the river. Single 'change bank' marks are only used in combination with the 'touch and go' mark.
 - ii) Referring to navigation in the downstream direction, if it is placed on the right bank, it indicates that you have to move to the other bank; if it is placed on the left bank, it indicates that you have to approach the bank. Ships must always move in the direction indicated by the white triangle.
 - iii) Encode **category of lateral mark** (CATLAM) with 26 (change bank)
- D) Continue Along Bank (Used only in the Po river (Italy))
- i) 'Continue along bank' marks are used to indicate that the recommended track continues along the bank on which it is placed.
 - ii) Referring to navigation in both directions, it generally follows a 'Change bank' mark.
 - iii) It is repeated about every 0.5 km, until the next 'Change bank' mark.
 - iv) Encode **category of lateral mark** (CATLAM) with 27 (continue along the bank)
- E) Touch and Go (Used only in the Po river (Italy))
- i) It is used instead of two consecutive 'Change bank' marks, which should be placed very close on the same bank, to indicate that the recommended track changes again to the previous side of the waterway.
 - ii) It is preceded and followed by two 'Change bank' marks, both on the opposite bank of the waterway.
 - iii) Encode **category of lateral mark** (CATLAM) with 26 (change bank)

20.10 Cardinal beacon

IHO Definition: CARDINAL BEACON. A cardinal beacon is used in conjunction with the compass to indicate where the mariner may find the best navigable water. It is placed in one of the four quadrants (North, East, South and West), bounded by inter-cardinal bearings from the point marked. (UKHO NP 735, 5th Edition).

S-401 Geo Feature: Cardinal Beacon (BCNCAR) (O)

Primitives: Point

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
beacon shape	(BCNSHP)	1 : stake, pole, perch, post 2 : withy 3 : beacon tower 4 : lattice beacon 5 : pile beacon 6 : cairn 7 : buoyant beacon	EN	1,1
category of cardinal mark	(CATCAM)	1 : north cardinal mark 2 : east cardinal mark 3 : south cardinal mark 4 : west cardinal mark	EN	1,1
colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,* (ordered)
colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1 [†]

<i>condition</i>	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
<i>elevation</i>	(ELEVAT)		RE	0,1
<i>feature name</i>		See clause 2.5.8	C	0,*
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
<i>fixed date range</i>		See clause 2.4.8	C	0,1
<i>date end</i>	(DATEND)		(S) TD	0,1 [†]
<i>date start</i>	(DATSTA)		(S) TD	0,1 [†]
<i>height</i>	(HEIGHT)		RE	0,1
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>marks navigational – system of</i>	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 11 : main European inland waterway marking system	EN	0,1
<i>nature of construction</i>	(NATCON)	1 : masonry 2 : concreted 6 : wooden 7 : metal 8 : glass reinforced plastic	EN	0,*
<i>periodic date range</i>		See clause 2.4.8	C	0,*
<i>date end</i>	(PEREND)		(S) TD	1,1
<i>date start</i>	(PERSTA)		(S) TD	1,1
<i>radar conspicuous</i>	(CONRAD)		BO	0,1
<i>reported date</i>	(SORDAT)	See clause 2.4.8	TD	0,1
<i>status</i>	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 12 : illuminated 18 : existence doubtful	EN	0,*
<i>topmark</i>	(TOPMAR)		C	0,1

colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	(S) EN	0, * (ordered)
colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe 7 : Single Colour 8 : Rectangle 9 : Triangle	(S) EN	0,1 †
topmark/daymark shape	(TOPSHP)	1 : cone (point up) 2 : cone (point down) 3 : sphere 4 : 2 spheres 5 : cylinder 6 : board 7 : x-shaped 8 : upright cross 9 : cube (point up) 10 : 2 cones (point to point) 11 : 2 cones (base to base) 12 : rhombus 13 : 2 cones (points upward) 14 : 2 cones (points downward) 15 : besom (point up) 16 : besom (point down) 17 : flag 18 : sphere over a rhombus 19 : square 20 : rectangle (horizontal) 21 : rectangle (vertical) 22 : trapezium (up) 23 : trapezium (down) 24 : triangle (point up) 25 : triangle (point down) 26 : circle 27 : two upright crosses (one over the other) 28 : T-shape 29 : triangle pointing up over a circle 30 : upright cross over a circle 31 : rhombus over a circle 32 : circle over a triangle pointing up 33 : other shape (see shape information) 34 : tubular	(S) EN	1,1
shape information			(S) C	0,*

language		ISO 639-2/T	(S) TE	0,1
text	(INFORM) (NINFORM)		(S) TE	1,1
vertical length	(VERLEN)		RE	0,1
visual prominence	(CONVIS)	1 : visually conspicuous 2 : not visually conspicuous 3 : prominent	EN	0,1
scale minimum	(SCAMIN)	[EUR: 22000, US: 60000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
pictorial representation	(PICREP)	See clause 2.4.12.2	TE	0,1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *

<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Structure	Structure/Equipment (see clause 25.12)	Daymark, Distance Mark, Fog Signal, Light All Around, Light Sectored, Notice Mark, Physical AIS Aid to Navigation, Radar Transponder Beacon, Signal Station Traffic, Signal Station Warning	Composition	0,1
The Component	Aids to Navigation Association (see clause 25.2)	Fairway System, Traffic Separation Scheme, Two-Way Route	Association	0,*
The Auxiliary Feature	Fairway Auxiliary (see clause 25.6)	Fairway	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] The attribute/sub-attribute **colour pattern** is mandatory for beacons/topmarks that have more than one value populated for the attribute/sub-attribute **colour**.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

20.10.1 Cardinal beacons

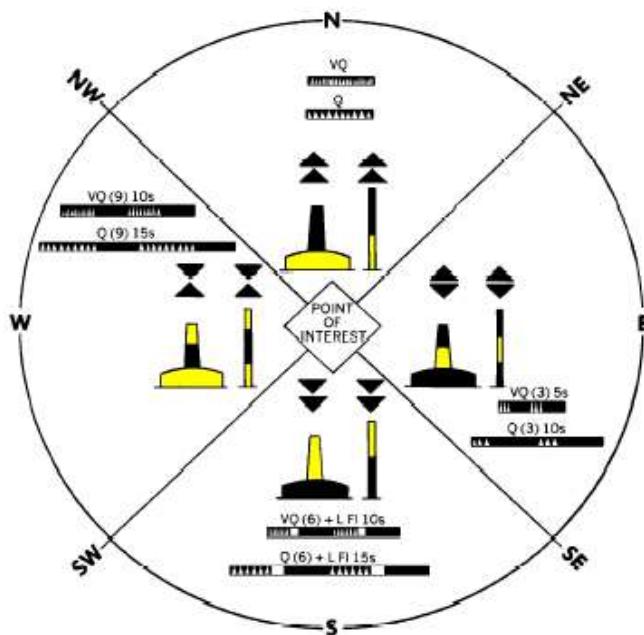
Cardinal marks are used in conjunction with the compass to indicate where a boatmaster may find best navigable water, taking their name from the quadrant in which they are placed in relation to the point marked. The boatmaster should pass N of a North mark, E of an East mark, etc.

To conform to the IALA Maritime Buoyage System (see clause 18.3.1.1), the body of the beacon has black and yellow bands, configured with black reflecting the points of the topmark cones (for example black above yellow for north). Black double-cone topmarks are an important feature of cardinal marks and are carried wherever practicable. The points are up for a north mark, down for a south mark, apart for an east mark and together for a west mark. Lights (if fitted) are white Q or VQ, uninterrupted for the north, 3 flashes for east, 6 flashes + LFI for south and 9 flashes for west (resembling an analogue clock).

If it is required to encode a beacon having the function of a cardinal mark, it must be done using the feature **Cardinal Beacon**.

IALA MARITIME BUOYAGE SYSTEM CARDINAL MARKS REGIONS A AND B

Topmarks are always fitted (when practicable).
Buoy shapes are pillar or spar.



Lights, when fitted, are **white**. Very Quick Flashing
or Quick Flashing; a South mark also has a
Long Flash immediately following the quick flashes.

Figure 20-6 – IALA cardinal beacons – Characteristics

Remarks:

- If it is required to encode a beacon or topmark that has more than one colour, the attributes **colour** and **colour pattern** must be encoded, according to the rules laid out in clause 2.4.10.
- For guidance on the encoding of the attributes **elevation**, **height** and **vertical length** see clause 2.5.7. **elevation** applies only to beacons on land. Values populated for **height** and **vertical length** must include the topmark and any equipment features.
- If it is required to encode a cairn that bears the colour(s) specified by a navigational system of marks, it must be done using a beacon feature.

Distinction: Daymark; Isolated Danger Beacon; Lateral Beacon; Safe Water Beacon; Special Purpose/General Beacon.

Inland specific Encoding Instructions:

- A) EUR: The designator as it appears on the beacon, if it can be read from a passing vessel, should be encoded in the attribute **feature name** (OBJNAM). Administrative information on the beacon that is not relevant for navigation should be encoded in the attribute **information**. It is not repeated for each equipment feature.
- B) If the system of navigational marks of a special sign is different from the system mentioned in the metadata feature **Navigational System of Marks** (m_nsyst), or there is no **Navigational**

System of Marks (m_nsys) metadata feature in the cell, the attribute **marks navigational – system of** (MARSYS) must be used.

20.11 Isolated danger beacon

IHO Definition: ISOLATED DANGER BEACON. An isolated danger beacon is a beacon erected on an isolated danger of limited extent, which has navigable water all around it. (UKHO NP735, 5th Edition).

S-401 Geo Feature: Isolated Danger Beacon (BCNISD) (M)

Primitives: Point

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
beacon shape	(BCNSHP)	1 : stake, pole, perch, post 2 : withy 3 : beacon tower 4 : lattice beacon 5 : pile beacon 6 : cairn 7 : buoyant beacon	EN	1,1
colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,* (ordered)
colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1 [†]
condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1

<i>elevation</i>	(ELEVAT)		RE	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
<i>fixed date range</i>		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
<i>height</i>	(HEIGHT)		RE	0,1
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>marks navigational – system of</i>	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 10 : other system 11 : main European inland waterway marking system 12 : Russian inland waterway regulations 13 : Brazilian national inland waterway regulation 15 : Paraguay-Parana waterway - Brazilian complementary aids	EN	0,1
<i>nature of construction</i>	(NATCON)	1 : masonry 2 : concreted 6 : wooden 7 : metal 8 : glass reinforced plastic	EN	0,*
<i>periodic date range</i>		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
radar conspicuous	(CONRAD)		BO	0,1
reported date	(SORDAT)	See clause 2.4.8	TD	0,1
<i>status</i>	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 12 : illuminated 18 : existence doubtful	EN	0,*
topmark	(TOPMAR)		C	0,1
colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey	(S) EN	0,* (ordered)

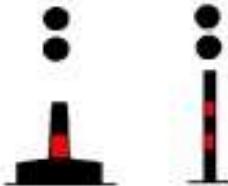
		8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink		
colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe 7 : Single Colour 8 : Rectangle 9 : Triangle	(S) EN	0,1 [†]
topmark/daymark shape	(TOPSHP)	1 : cone (point up) 2 : cone (point down) 3 : sphere 4 : 2 spheres 5 : cylinder 6 : board 7 : x-shaped 8 : upright cross 9 : cube (point up) 10 : 2 cones (point to point) 11 : 2 cones (base to base) 12 : rhombus 13 : 2 cones (points upward) 14 : 2 cones (points downward) 15 : besom (point up) 16 : besom (point down) 17 : flag 18 : sphere over a rhombus 19 : square 20 : rectangle (horizontal) 21 : rectangle (vertical) 22 : trapezium (up) 23 : trapezium (down) 24 : triangle (point up) 25 : triangle (point down) 26 : circle 27 : two upright crosses (one over the other) 28 : T-shape 29 : triangle pointing up over a circle 30 : upright cross over a circle 31 : rhombus over a circle 32 : circle over a triangle pointing up 33 : other shape (see shape information) 34 : tubular	(S) EN	1,1
shape information			(S) C	0,*
language		ISO 639-2/T	(S) TE	0,1
text	(INFORM) (NINFORM)		(S) TE	1,1
vertical length	(VERLEN)		RE	0,1

<i>visual prominence</i>	(CONVIS)	1 : visually conspicuous 2 : not visually conspicuous 3 : prominent	EN	0,1
scale minimum	(SCAMIN)	[BR: 50000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFOM)		(S) TE	0,1 †
<i>pictorial representation</i>	(PICREP)	See clause 2.4.12.2	TE	0,1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display	(S) EN	0,1 †

		2 : alternate name display		
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Structure	Structure/Equipment (see clause 25.12)	Daymark, Distance Mark, Fog Signal, Light All Around, Light Sectored, Notice Mark, Physical AIS Aid to Navigation, Radar Transponder Beacon, Signal Station Traffic, Signal Station Warning	Composition	0,1
The Component	Aids to Navigation Association (see clause 25.2)	Fairway System, Traffic Separation Scheme, Two-Way Route	Association	0,*
The Auxiliary Feature	Fairway Auxiliary (see clause 25.6)	Fairway	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*
<p>[†] The attribute/sub-attribute colour pattern is mandatory for beacons/topmarks that have more than one value populated for the attribute/sub-attribute colour.</p> <p>Complex attribute feature name, sub-attribute name usage is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.</p> <p>For each instance of fixed date range, at least one of the sub-attributes date end or date start must be populated.</p> <p>For each instance of information, at least one of the sub-attributes file reference or text must be populated.</p>				
<h3>20.11.1 Isolated danger beacons</h3> <p>Isolated danger beacons are placed on isolated dangers of limited extent with navigable water all around them.</p> <p>To conform to the IALA Maritime Buoyage System (see clause 18.3.1.1), the body of an isolated danger beacon is black, with one or more red bands. Black double-sphere topmarks are an important feature of isolated danger beacons and carried wherever practicable. The light (if fitted) is white F(2).</p> <p>If it is required to encode a beacon having the function of an isolated danger mark, it must be done using the feature Isolated Danger Beacon.</p>				

IALA MARITIME BUOYAGE SYSTEM REGIONS A AND B ISOLATED DANGER MARKS

Topmarks are always fitted (when practicable).



Light, when fitted, is white
Group Flashing (2)

 Fl (2)

Shape: Optional, but not conflicting with lateral marks; pillar or spar preferred.

Figure 20-7 – IALA isolated danger beacons – Characteristics

Remarks:

- If it is required to encode a beacon or topmark that has more than one colour, the attributes **colour** and **colour pattern** must be encoded, according to the rules laid out in clause 2.4.10.
- For guidance on the encoding of the attributes **elevation**, **height** and **vertical length** see clause 2.5.7. **elevation** applies only to beacons on land. Values populated for **height** and **vertical length** must include the topmark and any equipment features.
- If it is required to encode a cairn that bears the colour(s) specified by a navigational system of marks, it must be done using a beacon feature.

Distinction: Cardinal Beacon; Daymark; Lateral Beacon; Safe Water Beacon; Special Purpose/General Beacon.

Inland specific Encoding Instructions:

- A) BR: If there is any complementary characteristic on the beacon, it should be described in the attribute **information** (INFORM).
- B) In the event there is a light on the beacon, the **Isolated Danger Beacon** (BCNISD) feature should be designated as the structure and coded with the name of the light.
- C) BR: The national number of the beacon (if it exists) should be encoded in the attribute **information**. It is not repeated for each equipment feature.

20.12 Safe water beacon

IHO Definition: SAFE WATER BEACON. A safe water beacon is used to indicate that there is navigable water around the mark. (UKHO NP735, 5 th Edition).				
S-401 Geo Feature: Safe Water Beacon (BCNSAW) (O)				
Primitives: Point				
<i>Real World</i>		<i>Paper Chart Symbol</i>		<i>Inland ECDIS or ECS Symbol</i>
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
beacon shape	(BCNSHP)	1 : stake, pole, perch, post 2 : withy 3 : beacon tower 4 : lattice beacon 5 : pile beacon 6 : cairn 7 : buoyant beacon	EN	1,1
colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,* (ordered)
colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1 [†]
condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
elevation	(ELEVAT)		RE	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

<i>fixed date range</i>		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
<i>height</i>	(HEIGHT)		RE	0,1
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>marks navigational – system of</i>	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 10 : other system 11 : main European inland waterway marking system 12 : Russian inland waterway regulations 13 : Brazilian national inland waterway regulation 15 : Paraguay-Parana waterway - Brazilian complementary aids	EN	0,1
<i>nature of construction</i>	(NATCON)	1 : masonry 2 : concreted 6 : wooden 7 : metal 8 : glass reinforced plastic	EN	0,*
<i>periodic date range</i>		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
radar conspicuous	(CONRAD)		BO	0,1
reported date	(SORDAT)	See clause 2.4.8	TD	0,1
<i>status</i>	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 12 : illuminated 18 : existence doubtful	EN	0,*
topmark	(TOPMAR)		C	0,1
colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	(S) EN	0,* (ordered)
colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared	(S) EN	0,1 †

		5 : stripes (direction unknown) 6 : border stripe 7 : Single Colour 8 : Rectangle 9 : Triangle		
topmark/daymark shape	(TOPSHP)	1 : cone (point up) 2 : cone (point down) 3 : sphere 4 : 2 spheres 5 : cylinder 6 : board 7 : x-shaped 8 : upright cross 9 : cube (point up) 10 : 2 cones (point to point) 11 : 2 cones (base to base) 12 : rhombus 13 : 2 cones (points upward) 14 : 2 cones (points downward) 15 : besom (point up) 16 : besom (point down) 17 : flag 18 : sphere over a rhombus 19 : square 20 : rectangle (horizontal) 21 : rectangle (vertical) 22 : trapezium (up) 23 : trapezium (down) 24 : triangle (point up) 25 : triangle (point down) 26 : circle 27 : two upright crosses (one over the other) 28 : T-shape 29 : triangle pointing up over a circle 30 : upright cross over a circle 31 : rhombus over a circle 32 : circle over a triangle pointing up 33 : other shape (see shape information) 34 : tubular	(S) EN	1,1
shape information			(S) C	0,*
language		ISO 639-2/T	(S) TE	0,1
text	(INFORM) (NINFORM)		(S) TE	1,1
vertical length	(VERLEN)		RE	0,1
visual prominence	(CONVIS)	1 : visually conspicuous 2 : not visually conspicuous 3 : prominent	EN	0,1
scale minimum	(SCAMIN)	[EUR: 45000, US: 60000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †

headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
pictorial representation	(PICREP)	See clause 2.4.12.2	TE	0,1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity

The Structure	Structure/Equipment (see clause 25.12)	Daymark, Distance Mark, Fog Signal, Light All Around, Light Sectored, Notice Mark, Physical AIS Aid to Navigation, Radar Transponder Beacon, Signal Station Traffic, Signal Station Warning	Composition	0,1
The Component	Aids to Navigation Association (see clause 25.2)	Fairway System, Traffic Separation Scheme, Two-Way Route	Association	0,*
The Auxiliary Feature	Fairway Auxiliary (see clause 25.6)	Fairway	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] The attribute/sub-attribute **colour pattern** is mandatory for beacons/topmarks that have more than one value populated for the attribute/sub-attribute **colour**.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

20.12.1 Safe water beacons

Safe water marks are used to indicate there is safe water all around the mark. It may be used as a centre-line, mid-channel or landfall beacon, or to mark the best point of passage under a bridge.

To conform to the IALA Maritime Buoyage System (see clause 18.3.1.1), the body of the mark has red and white vertical stripes. A red spherical topmark is an important feature and carried wherever practicable. The light (if fitted) is white Oc, Iso, LFI or Mo(A) with a period of 10s.

If it is required to encode a beacon having the function of a safe water mark, it must be done using the feature **Safe Water Beacon**.



Figure 20-8 – IALA safe water beacons – Characteristics

Remarks:

- If it is required to encode a beacon or topmark that has more than one colour, the attributes **colour** and **colour pattern** must be encoded, according to the rules laid out in clause 2.4.10.
- For guidance on the encoding of the attributes **elevation**, **height** and **vertical length** see clause 2.5.7. **elevation** applies only to beacons on land. Values populated for **height** and **vertical length** must include the topmark and any equipment features.
- If it is required to encode a cairn that bears the colour(s) specified by a navigational system of marks, it must be done using a beacon feature.

Distinction: Cardinal Beacon; Daymark; Isolated Danger Beacon; Lateral Beacon; Special Purpose/General Beacon.

Inland specific Encoding Instructions:

- A) EUR: The designator as it appears on the beacon, if it can be read from a passing vessel, should be encoded in the attribute **feature name** (OBJNAM). Administrative information on the beacon that is not relevant for navigation should be encoded in the attribute **information**. It is not repeated for each equipment feature.
- B) In case the attribute **topmark** (TOPMAR) is added: **topmark/daymark shape** (TOPSHP) = 3 (sphere) and **colour** (COLOUR) = (3 (red)).
- C) If the system of navigational marks of a special sign is different from the system mentioned in the metadata feature **Navigational System of Marks** (m_nsyst), or there is no **Navigational System of Marks** (m_nsyst) metadata feature in the cell, the attribute **marks navigational – system of** (MARSYS) must be used.

20.13 Special purpose/general beacon

IHO Definition: **SPECIAL PURPOSE/GENERAL BEACON.** A special purpose beacon is primarily used to indicate an area or feature, the nature of which is apparent from reference to a chart, Sailing Directions or Notices to Mariners. (UKHO NP 735, 5th Edition).

S-401 Geo Feature: Special Purpose/General Beacon (BCNSPP) (M)

Primitives: Point

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
beacon shape	(BCNSHP)	1 : stake, pole, perch, post 2 : withy 3 : beacon tower 4 : lattice beacon 5 : pile beacon 6 : cairn 7 : buoyant beacon	EN	1,1
category of special purpose mark	(CATSPM)	1 : firing danger area mark 2 : target mark 3 : marker ship mark 4 : degaussing range mark 5 : barge mark 6 : cable mark 7 : spoil ground mark 8 : outfall mark 10 : recording mark 11 : seaplane anchorage mark 12 : recreation zone mark 14 : mooring mark 16 : leading mark 17 : measured distance mark 18 : notice mark 19 : TSS mark (Traffic Separation Scheme) 20 : anchoring prohibited mark 21 : berthing prohibited mark 22 : overtaking prohibited mark 23 : two-way traffic prohibited mark 24 : reduced wake mark 25 : speed limit mark 26 : stop mark 27 : general warning mark 28 : sound ship's siren mark 29 : restricted vertical clearance mark 30 : maximum vessel's draught mark 31 : restricted horizontal clearance mark 32 : strong current warning mark 33 : berthing permitted mark 34 : overhead power cable mark 35 : channel edge gradient mark 36 : telephone mark 37 : ferry crossing mark 39 : pipeline mark 40 : anchorage mark 41 : clearing mark	EN	1,*

		42 : control mark 43 : diving mark 44 : refuge beacon 45 : foul ground mark 46 : yachting mark 47 : heliport mark 48 : GNSS mark 49 : seaplane landing mark 50 : entry prohibited mark 51 : work in progress mark 52 : mark with unknown purpose 53 : wellhead mark 54 : channel separation mark 55 : marine farm mark 56 : artificial reef mark 57 : ice mark 58 : nature reserve mark 60 : wreck mark 61 : customs mark 62 : causeway mark 63 : wave recorder		
colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,* (ordered)
colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1 †
<i>condition</i>	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
<i>elevation</i>	(ELEVAT)		RE	0,1
<i>feature name</i>		See clause 2.5.8	C	0,*
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 †
<i>fixed date range</i>		See clause 2.4.8	C	0,1
<i>date end</i>	(DATEND)		(S) TD	0,1 †
<i>date start</i>	(DATSTA)		(S) TD	0,1 †
<i>height</i>	(HEIGHT)		RE	0,1
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1

<i>marks navigational – system of</i>	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 10 : other system 11 : main European inland waterway marking system 12 : Russian inland waterway regulations 13 : Brazilian national inland waterway regulation 15 : Paraguay-Parana waterway - Brazilian complementary aids	EN	0,1
<i>nature of construction</i>	(NATCON)	1 : masonry 2 : concreted 6 : wooden 7 : metal 8 : glass reinforced plastic	EN	0,*
<i>periodic date range</i>		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
radar conspicuous	(CONRAD)		BO	0,1
reported date	(SORDAT)	See clause 2.4.8	TD	0,1
<i>status</i>	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 12 : illuminated 18 : existence doubtful	EN	0,*
topmark	(TOPMAR)		C	0,1
colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	(S) EN	0,* (ordered)
colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe 7 : Single Colour 8 : Rectangle 9 : Triangle	(S) EN	0,1 [†]

topmark/daymark shape	(TOPSHP)	1 : cone (point up) 2 : cone (point down) 3 : sphere 4 : 2 spheres 5 : cylinder 6 : board 7 : x-shaped 8 : upright cross 9 : cube (point up) 10 : 2 cones (point to point) 11 : 2 cones (base to base) 12 : rhombus 13 : 2 cones (points upward) 14 : 2 cones (points downward) 15 : besom (point up) 16 : besom (point down) 17 : flag 18 : sphere over a rhombus 19 : square 20 : rectangle (horizontal) 21 : rectangle (vertical) 22 : trapezium (up) 23 : trapezium (down) 24 : triangle (point up) 25 : triangle (point down) 26 : circle 27 : two upright crosses (one over the other) 28 : T-shape 29 : triangle pointing up over a circle 30 : upright cross over a circle 31 : rhombus over a circle 32 : circle over a triangle pointing up 33 : other shape (see shape information) 34 : tubular	(S) EN	1,1
shape information			(S) C	0,*
language		ISO 639-2/T	(S) TE	0,1
text	(INFORM) (NINFOM)		(S) TE	1,1
<i>vertical length</i>	(VERLEN)		RE	0,1
visual prominence	(CONVIS)	1 : visually conspicuous 2 : not visually conspicuous 3 : prominent	EN	0,1
scale minimum	(SCAMIN)	[EUR: 45000, US: 60000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1

text	(INFORM) (NINFORM)		(S) TE	0,1 †
pictorial representation	(PICREP)	See clause 2.4.12.2	TE	0,1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Structure	Structure/Equipment (see clause 25.12)	Daymark, Distance Mark, Fog Signal, Light All Around, Light Sectored, Notice Mark, Physical AIS Aid to Navigation, Radar Transponder Beacon, Signal Station Traffic, Signal Station Warning	Composition	0,1
The Component	Aids to Navigation Association (see clause 25.2)	Fairway System, Traffic Separation Scheme, Two-Way Route	Association	0,*
The Auxiliary Feature	Fairway Auxiliary (see clause 25.6)	Fairway	Association	0,*

The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] The attribute/sub-attribute **colour pattern** is mandatory for beacons/topmarks that have more than one value populated for the attribute/sub-attribute **colour**.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

20.13.1 Special purpose/general beacons

Special beacons are used to indicate to the boatmaster a special area or feature, the nature of which is usually apparent from the chart or associated publication.

To conform to the IALA Maritime Buoyage System (see clause 18.3.1.1), the body of the beacon is yellow. The topmark (if fitted) is a yellow diagonal 'X' (St Andrew's cross). Lights (if fitted) are yellow and of any rhythm except those used for cardinal, isolated danger and safe water marks.

If it is required to encode a beacon having the function of a special purpose mark, or a beacon whose appearance or purpose is inadequately known, it must be done using the feature **Special Purpose/General Beacon**.

In the following Table, a blank indicates that the encoder may choose a relevant value for the attribute. The Table contains the most common examples of coding for maritime ENCs; other coding combinations are possible.

Feature	Feature	beacon shape	category of special purpose mark
Minor not permanent mark	Beacon ***	1	
Cairn	Beacon ***	6	
Beacon tower	Beacon ***	3	
Lattice beacon	Beacon ***	4	
Leading beacon	Special Purpose/General Beacon		16
Beacon marking a clearing line	Special Purpose/General Beacon		41
Beacon marking measured distance	Special Purpose/General Beacon		17
Cable landing beacon	Special Purpose/General Beacon		6
Outfall landing beacon	Special Purpose/General Beacon		8

Pipeline landing beacon	Special Purpose/General Beacon		39
Refuge beacon	Special Purpose/General Beacon		44
Firing practice area beacon	Special Purpose/General Beacon		1
Notice board	Special Purpose/General Beacon		18
Buoyant beacon	Special Purpose/General Beacon	7	

Table 20-2 – IALA special purpose beacons – Common typesRemarks:

- Non-beacon structures (for example chimneys, masts, towers) that are also used to serve the purpose of a special purpose beacon must be encoded, where required, using the feature **Landmark** (see clause 7.2).
- If it is required to encode a beacon or topmark that has more than one colour, the attributes **colour** and **colour pattern** must be encoded, according to the rules laid out in clause 2.4.10.
- For guidance on the encoding of the attributes **elevation**, **height** and **vertical length** see clause 2.5.7. **elevation** applies only to beacons on land. Values populated for **height** and **vertical length** must include the topmark and any equipment features.
- If a special purpose beacon does not conform to the system of navigational marks defined by **Navigational System of Marks** (see clause 3.6), the attribute **marks navigational – system of** on the **Special Purpose/General Beacon** should be encoded. If the beacon does not belong to any of the listed systems 9 (no system) has to be encoded.
- If it is required to encode a cairn that bears the colour(s) specified by a navigational system of marks, it must be done using a beacon feature.

20.13.2 Signs and notice boards

If it is required to encode a fixed or floating sign or notice board, it must be done using a **Special Purpose/General Beacon** feature or **Special Purpose/General Buoy** feature (see clause 20.5), with attribute **category of special purpose mark** = 18 (notice mark), or using the feature **Daymark** (see clause 20.14).

Remarks:

- If it is required to encode a sign or notice board that has more than one colour, the attributes **colour** and **colour pattern** must be used, according to the rules laid out in clause 2.4.10.
- If it is required to encode any text shown on a notice board or sign, it must be done using the complex attribute **information** (see clause 2.4.6).
- If it is required to encode the shape and colour of a notice board, it must be done by encoding the board as a **Daymark** feature.

Distinction: Cardinal Beacon; Daymark; Isolated Danger Beacon; Landmark; Lateral Beacon; Safe Water Beacon.

Inland specific Encoding Instructions:

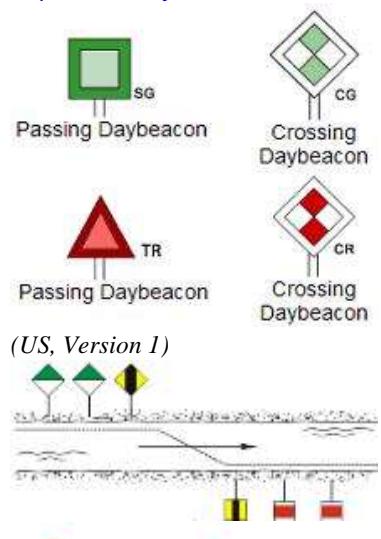
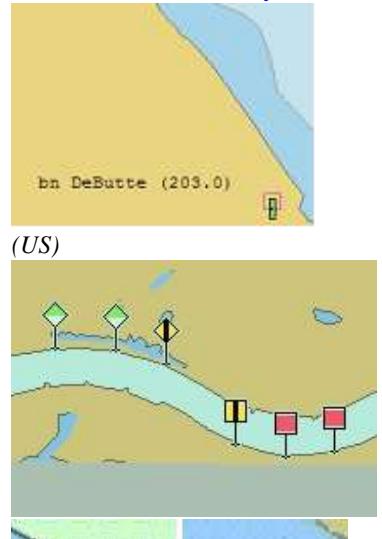
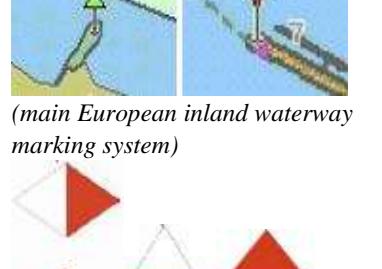
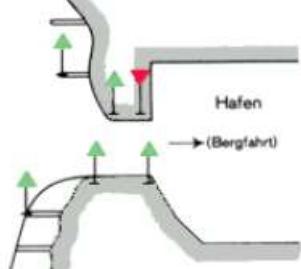
- A) EUR: The designator as it appears on the beacon, if it can be read from a passing vessel, should be encoded in the attribute **feature name** (OBJNAM). Administrative information on the buoys that is not relevant for navigation should be encoded in the attribute **information**. It is not repeated for each equipment feature.
- B) If the system of navigational marks of a special sign is different from the system mentioned in the metadata feature **Navigational System of Marks** (m_nsys), or there is no **Navigational System of Marks** (m_nsys) metadata feature in the cell, the attribute **marks navigational – system of** (MARSYS) must be used.

20.14 Daymark

IHO Definition: **DAYMARK.** The identifying characteristics of an aid to navigation which serve to facilitate its recognition against a daylight viewing background. On those structures that do not by themselves present an adequate viewing area to be seen at the required distance, the aid is made more visible by affixing a daymark to the structure. A daymark so affixed has a distinctive colour and shape depending on the purpose of the aid. (IHO Dictionary – S-32, Edition 5).
For IENCs daymarks are used to code passing and crossing day beacons on the inland river system.

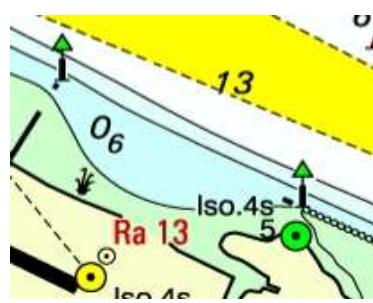
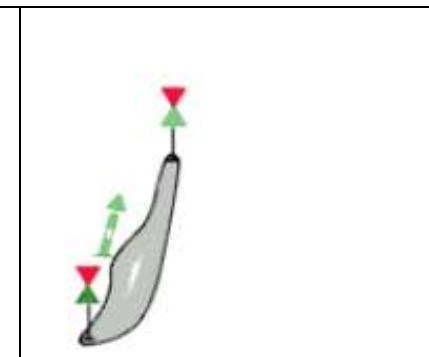
S-401 Geo Feature: Daymark (DAYMAR, daymar) (M)

Primitives: Point

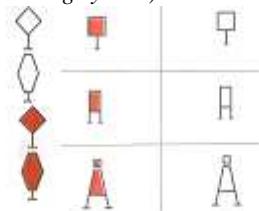
Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol
 (US)		 (US)
 (main European inland waterway marking system)		 (main European inland waterway marking system)
		 (Italy, Po river)



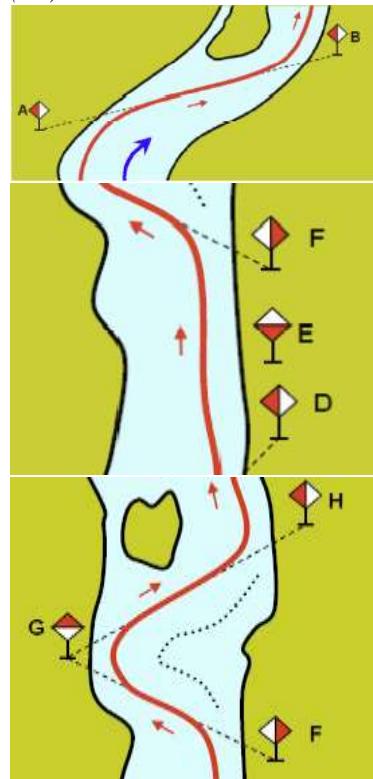
(Italy, Po river)



(main European inland waterway marking system)



(RF)



(Italy, Po river)

S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
<i>category of special purpose mark</i>	(CATSPM)	1 : firing danger mark 2 : target mark 3 : marker ship mark 4 : degaussing range mark 5 : barge mark 6 : cable mark 7 : spoil ground mark 8 : outfall mark 10 : recording mark 11 : seaplane anchorage mark 12 : recreation zone mark 14 : mooring mark 15 : LANBY 16 : leading mark 17 : measured distance mark 18 : notice mark 19 : TSS mark (Traffic Separation Scheme) 20 : anchoring prohibited mark 21 : berthing prohibited mark 22 : overtaking prohibited mark 23 : two-way traffic prohibited mark 24 : reduced wake mark 25 : speed limit mark 26 : stop mark 27 : general warning mark 28 : sound ship's siren mark 29 : restricted vertical clearance mark 30 : maximum vessel's draught mark 31 : restricted horizontal clearance mark 32 : strong current warning mark 33 : berthing permitted mark 34 : overhead power cable mark 35 : channel edge gradient mark 36 : telephone mark 37 : ferry crossing mark 39 : pipeline mark 40 : anchorage mark 41 : clearing mark 42 : control mark 43 : diving mark 44 : refuge beacon 45 : foul ground mark 46 : yachting mark 47 : heliport mark 48 : GNSS mark 49 : seaplane landing mark 50 : entry prohibited mark 51 : work in progress mark 52 : mark with unknown purpose 53 : wellhead mark 54 : channel separation mark 55 : marine farm mark	EN	0,*

		56 : artificial reef mark 57 : ice mark 58 : nature reserve mark 60 : wreck mark 61 : customs mark 62 : causeway mark 63 : wave recorder		
colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,* (ordered)
colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1 †
elevation	(ELEVAT)		RE	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
height	(HEIGHT)		RE	0,1
interoperability identifier		MRN (see clause 27.161)	URN	0,1
nature of construction	(NATCON)	1 : masonry 2 : concreted 4 : hard surfaced 6 : wooden 7 : metal 8 : glass reinforced plastic 11 : latticed	EN	0,*
periodic date range		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
radar conspicuous	(CONRAD)		BO	0,1

<i>status</i>	(STATUS)	1 : permanent 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 12: illuminated	EN	0,*
topmark/daymark shape	(TOPSHP)	1 : cone (point up) 2 : cone (point down) 3 : sphere 4 : 2 spheres 5 : cylinder 6 : board 7 : x-shaped 8 : upright cross 9 : cube (point up) 10 : 2 cones (point to point) 11 : 2 cones (base to base) 12 : rhombus 13 : 2 cones (points upward) 14 : 2 cones (points downward) 15 : besom (point up) 16 : besom (point down) 17 : flag 18 : sphere over a rhombus 19 : square 20 : rectangle (horizontal) 21 : rectangle (vertical) 22 : trapezium (up) 23 : trapezium (down) 24 : triangle (point up) 25 : triangle (point down) 26 : circle 27 : two upright crosses (one over the other) 28 : T-shape 29 : triangle pointing up over a circle 30 : upright cross over a circle 31 : rhombus over a circle 32 : circle over a triangle pointing up 33 : other shape (see shape information)	EN	1,1
<i>vertical length</i>	(VERLEN)		RE	0,1
shape information			C	0,*
language		ISO 639-2/T	(S) TE	0,1
text	(INFORM) (NINFORM)		(S) TE	1,1
scale minimum	(SCAMIN)	[EUR: 22000, US: 60000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 +
headline			(S) TE	0,1

language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
pictorial representation	(PICREP)	See clause 2.4.12.2	TE	0,1
Orientation			C	0, 1
Orientation Uncertainty			(S) RE	0, 1
Orientation Value	(ORIENT)	[xxx.xx or "unknown"] (degree (°)), e.g., 110.76	(S) RE	1, 1
Direction of Impact	(dirimp)	1 : Upstream 2 : Downstream 3 : To the Left Bank 4 : To the Right Bank 5 : To Harbour	EN	0, 1
Condition	(CONDTN)	1 : Under Construction 2 : Ruined 3 : Under Reclamation 5 : Planned Construction	EN	0, 1
Reported Date	(SORDAT)		TD	0, 1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*

language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Structure	Structure/Equipment (see clause 25.12)	Distance Mark, Fog Signal, Light All Around, Light Sectored, Physical AIS Aid to Navigation, Radar Transponder Beacon, Signal Station Traffic, Signal Station Warning	Composition	0,1
The Equipment	Structure/Equipment (see clause 25.12)	Cardinal Beacon, Cardinal Buoy, Bridge, Building, Crane, Conveyor, Dolphin, Emergency Wreck Marking Buoy, Exceptional Navigation Structure, Fishing Facility, Floating Dock, Fortified Structure, Hulk, Installation Buoy, Isolated Danger Beacon, Isolated Danger Buoy, Landmark, Lateral Beacon, Lateral Buoy, Mooring Buoy, Offshore Platform, Pile, Pipeline Overhead, Pontoon, Pylon/Bridge Support, Safe Water Beacon, Safe Water Buoy, Shoreline Construction, Silo/Tank, Span Fixed, Span Opening, Special Purpose/General Beacon, Special Purpose/General Buoy, Structure Over Navigable Water, Wind Turbine, Wreck	Association	0,*
The Component	Aids to Navigation Association (see clause 25.2)	Fairway System, Traffic Separation Scheme, Two-Way Route	Association	0,*
The Auxiliary Feature	Fairway Auxiliary (see clause 25.6)	Fairway	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] The attribute **colour pattern** is mandatory for daymarks that have more than one value populated for the attribute **colour**.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

_ For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

20.14.1 Daymarks

If it is required to encode a daymark, it must be done using the feature **Daymark**.

The term “daymark” may also simply refer to any unlighted aid to navigation, particularly for leading marks. In North America, the term “daybeacon” is used for an unlit beacon.

In the following Table, a blank indicates that the encoder may choose a relevant value for the attribute. The Table contains the most common examples of coding for maritime ENCs; other coding combinations are possible.

Feature	Feature	category of special purpose mark	Other attributes
Coloured or white mark	Daymark		nature of construction = 9
Coloured topmark with function of beacon	Daymark		nature of construction = 9
Painted board with function of leading beacon	Daymark	16	topmark shape = 6

Table 20-3 – Daymarks – Examples

Remarks:

- For guidance on the encoding of the attributes **elevation**, **height** and **vertical length** see clause 2.5.7. **elevation** applies only to daymarks on land. Values populated for **height** and **vertical length** must include any equipment features.
- If it is required to encode a cairn that bears the colour(s) specified by a navigational system of marks, it must be done using a beacon feature.
- If it is required to encode an aid to navigation that may be considered to be a topmark but has multiple colours that are considered important for navigation, this should be done using **Daymark**.
- If it is required to encode a daymark that has more than one colour, the attributes **colour** and **colour pattern** must be encoded, according to the rules laid out in clause 2.4.10. If the colour pattern for the daymark is complex, it is strongly recommended that an image of the daymark is included, using the attribute **pictorial representation**.

Distinction: Cardinal Beacon; Isolated Danger Beacon; Lateral Beacon; Safe Water Beacon; Special Purpose/General Beacon; Topmark.

Inland specific Encoding Instructions:

- A) EUR: For marks with **marks navigational – system of** (MARSYS) = 11 indicating the position of the channel the **Daymark** (DAYMAR, daymar) **colour** (COLOUR)/ **colour pattern** (COLPAT)/ **topmark/daymark shape** (TOPSHP) attributes must be used in the following combinations:
1, 3, 1 (white, red, white), 1 (horizontal stripes) and 19 (square) for the right hand shore or
4, 1 (green, white), 1 (horizontal stripes) and 12 (rhombus (diamond)) for the left hand shore.
- B) EUR: For marks with **marks navigational – system of** (MARSYS) = 11 indicating danger points **Daymark** (DAYMAR, daymar) **colour** (COLOUR)/ **topmark/daymark shape** (TOPSHP)

	<p>attributes must be used in the following combinations:</p> <p>3 (red) and 2 (cone, point down) for the right hand shore or 4 (green) and 1 (cone, point up) for the left hand shore</p>
C)	US: For daybeacons with more than one colour, such as a crossing or non-laterally significant daybeacon, use multiple colour (COLOUR) attributes and populate the colour pattern (COLPAT) attribute based upon the colour pattern of the daybeacon. For example, a NR daybeacon would be encoded as colour (COLOUR) = 1,3 with topmark/daymark shape (TOPSHP) = 12 (rhombus(diamond)), and colour pattern (COLPAT) = 4 (squared).
D)	Code two Daymark (DAYMAR, daymar) features at the same location if two different daymarks are present. Use direction of impact (DIRIMP) to designate whether the Daymark impacts up-bound or down-bound traffic. If only 1 Daymark is present but only impacts one direction, direction of impact (DIRIMP) should also be used.
E)	If two Daymark (DAYMAR, daymar) features are at the same location, as in letter D, for the Daymark that is visible to up-bound vessels code orientation value (ORIENT) to indicate the heading of an up-bound vessel parallel to the riverbank (North = 0 degrees) and for the Daymark that is visible to down-bound vessels code orientation value (ORIENT) to indicate the heading of a down-bound vessel parallel to the riverbank.
F)	<p>Change bank Daymarks on the Po river in Italy</p> <ul style="list-style-type: none"> i) 'Change bank' marks are used in pairs (two equal marks, one on each bank); the alignment of the two marks indicates the track to be followed for crossing the river. Single 'change bank' marks are only used in combination with the 'touch and go' mark. ii) Referring to navigation in the downstream direction, if it is placed on the right bank, it indicates that you have to move to the other bank; if it is place on the left bank, it indicates that you have to approach the bank. Ships must always move in the direction indicated by the white triangle. iii) colour (COLOUR) = [1 (white), 3 (red)] when, navigating in the downstream direction, the ship has to move to the left bank, or when navigating in the upstream direction, the ship has to move to the right bank. iv) colour (COLOUR) = [3 (red), 1 (white)] when, navigating in the downstream direction, the ship has to move to the right bank, or when navigating in the upstream direction, the ship has to move to the left bank.
G)	<p>Continue along bank Daymarks on the Po river in Italy</p> <ul style="list-style-type: none"> i) 'Continue along bank' marks are used to indicate that the recommended track continues along the bank on which it is placed. ii) Referring to navigation in both directions, it generally follows a 'Change bank' mark. iii) It is repeated about every 0.5 km, until the next 'Change bank' mark. iv) In this case colour (COLOUR) has to be always encoded as [1,3].
H)	<p>Touch and go Daymarks on the Po river in Italy</p> <ul style="list-style-type: none"> i) It is used instead of two consecutive 'Change bank' marks, which should be placed very close on the same bank, to indicate that the recommended track changes again to the previous side of the waterway. ii) It is preceded and followed by two 'Change bank' marks, both on the opposite bank of the waterway. iii) In this case colour (COLOUR) has to be always encoded as [3,1].

Radar reflector

<p>IHO Definition: RADAR REFLECTOR. A device capable of, or intended for, reflecting radar signals. (IHO Dictionary – S-32).</p> <p>S-401 Geo Feature: Radar Reflector (RADRFL) (C)</p> <p>Primitives: Point</p>				
<p><i>Real World</i></p>				
<p><i>Paper Chart Symbol</i></p>				
<p><i>Inland ECDIS or ECS Symbol</i></p>				
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
<i>fixed date range</i>		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
height	(HEIGHT)		RE	0,1
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>periodic date range</i>		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
status	(STATUS)	1 : permanent 4 : not in use 8 : private	EN	0,*
scale minimum	(SCAMIN)	[EUR: 22000, US: 45000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 [†]
Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military	(S) EN	0, 1

		10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Component	Bridge Aggregation (see clause 25.3)	Bridge	Association	0,*
The Component	Cable Overhead Aggregation (see clause 0)	Cable Overhead	Association	0,*
The Component	Pipeline Overhead Aggregation (see clause 0)	Pipeline Overhead	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

† For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

20.15.1 Radar reflectors

Remarks:

- A radar reflector is usually a tetrahedron or pentagonal corner reflector to facilitate reflection towards the sender. (International Maritime Dictionary, 2nd Edition).
- If it is required to encode a feature which has no radar reflector, but is radar conspicuous, it must be indicated using the mandatory attribute **radar conspicuous** = *True* on the feature.
- Where the location of a radar reflector(s) is known on an overhead cable or pipeline, a **Radar Reflector(s)** should be encoded, and associated to the **Cable Overhead** or **Pipeline Overhead** using a **Structure/Equipment** feature association (see clauses 6.10, 6.11 and 25.12).
- If it is required to encode a surface or point feature which is radar conspicuous because it is fitted with a radar reflector, it must be indicated using **radar conspicuous** = *True* on the feature. A **Radar Reflector** feature must not be encoded in this case.

Distinction:

Inland specific Encoding Instructions:

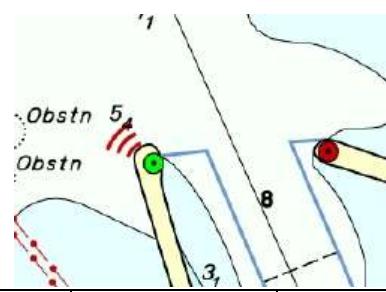
- A) Radar reflectors have to be encoded as feature if they are not encoded as an attribute of another feature.

20.16 Fog signal

IHO Definition: **FOG SIGNAL.** A warning signal transmitted by a vessel, or aid to navigation, during periods of low visibility. Also, the device producing such a signal. (IHO Dictionary – S-32).

S-401 Geo Feature: Fog Signal (FOGSIG) (M)

Primitives: Point

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
				
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of fog signal	(CATFOG)	1 : explosive 2 : diaphone 3 : siren 4 : nautophone 5 : reed 6 : tyfon 7 : bell 8 : whistle 9 : gong 10 : horn	EN	1,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
interoperability identifier		MRN (see clause 27.161)	URN	0,1
periodic date range		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
signal frequency	(SIGFRQ)	[xxxxxx] (Hz), e.g. 12 for 12 Hz	IN	0,1
signal generation	(SIGGEN)	1 : automatically 2 : by wave action 3 : by hand 4 : by wind 5 : radio activated 6 : call activated	EN	0,1

signal group	(SIGGRP)	[(x),(x)...], e.g., (), (2), (2+1)	TE	0,1
signal period	(SIGPER)	[xx.xx (e.g., signal period of 12 seconds coded as 12)]	RE	0,1
signal sequence	(SIGSEQ)	[LL.L + (EE.E)] (seconds)	C	0,* (ordered)
signal duration			(S) RE	1,1
signal status		1 : lit/sound 2 : eclipsed/silent	(S) EN	1,1
<i>status</i>	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 15 : synchronized	EN	0,*
value of maximum range	(VALMXR)	[xx.x]	RE	0,1
scale minimum	(SCAMIN)	[EUR: 22000, US: 60000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed	(S) EN	0, 1

		9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data		
.....Source	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Equipment	Structure/Equipment (see clause 25.12)	Cardinal Beacon, Cardinal Buoy, Bridge, Building, Crane, Conveyor, Daymark, Dolphin, Emergency Wreck Marking Buoy, Exceptional Navigation Structure, Fishing Facility, Floating Dock, Fortified Structure, Hulk, Installation Buoy, Isolated Danger Beacon, Isolated Danger Buoy, Landmark, Lateral Beacon, Lateral Buoy, Mooring Buoy, Offshore Platform, Pile, Pipeline Overhead, Pontoon, Pylon/Bridge Support, Safe Water Beacon, Safe Water Buoy, Shoreline Construction, Silo/Tank, Span Fixed, Span Opening, Special Purpose/General Beacon, Special Purpose/General Buoy, Structure Over Navigable Water, Wind Turbine, Wreck	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

20.16.1 Fog signals

The term "fog signal" refers to the sound emitted, not the apparatus. Fog signals are short range aids to navigation, principally used as hazard warnings. For various reasons they are unreliable as indicators of position. Their importance relative to other aids to navigation has declined but they are still considered useful for the safe navigation of vessels with very limited (or non-functioning) electronic equipment. A fog signal should be shown on IENCs at an optimum display scale on which vessels may navigate within range.

The position from which a fog signal is emitted is usually on a buoy, or close enough to a light to be treated as sounded from the same position as the light.

If it is required to encode a fog signal, it must be done using the feature **Fog Signal**.

Remarks:

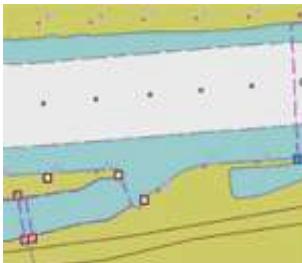
- The characteristic rhythm of fog signals (other than those actuated by waves, which are irregular) may be more important than their type when boatmasters are attempting to identify them. The number of sound emissions (for example blasts, strokes) and the period must therefore be encoded, where known, using the attributes **signal group**, **signal period** and **signal sequence**.
- Where required, the attribute **signal frequency** must be quoted in Hertz, for example a signal frequency of 950 MHz must be encoded as 950000000.
- If the fog signal is radio activated, the attribute **signal generation** must be populated with value 5 (radio activated). To encode the contact information for activation of the signal, it must be done using the information type **Contact Details** (see clause 24.1). The **Contact Details** must be associated to the **Fog Signal** feature using the association **Additional Information**.
- If the fog signal is activated by calling into a manned station, the attribute **signal generation** must be populated with value 6 (call activated). To encode the contact information for the manned station, it must be done using the information type **Contact Details**. The **Contact Details** must be associated to the **Fog Signal** feature using the association **Additional Information**.

Distinction: Signal Station Warning.

Inland specific Encoding Instructions:

- A) The name of the navigational aid must be encoded in the attribute **feature name** (OBJNAM) of the structure feature. It is not repeated for each equipment feature.
- B) The **signal group** (SIGGRP) is encoded using brackets to separate the individual groups. A group of signals may be a single number, a chain of numbers separated by "+", a sequence of up to 4 letters or a letter and a number.
- C) L in **signal sequence** (SIGSEQ) stands for signal duration in xx.x seconds. E stands for duration of silence in xx.x seconds.

20.17 Notice Mark

<p>IHO Definition: A notice board or sign indicating information to the mariner.</p> <p>S-401 Geo Feature: Notice Mark (notmrk) (M)</p> <p>Super Type:</p> <p>Primitives: point</p>		
<p><i>Real World</i></p>  <p>Europe</p>	<p><i>Paper Chart Symbol</i></p>	<p><i>Inland ECDIS or ECS Symbol</i></p>  <p>Europe</p>
		
		 <p>Brazil</p>
 <p>Brazil</p>		

  <p>Paraguay-Parana</p>		 <p>Paraguay-Parana</p>		
S-401 Attribute				
S-57 Acronym	Allowable Encoding Value	Type	Multiplicity	
Additional Mark	(addmrk)	1 : Top (Board) 2 : Bottom (Board) 3 : Right (Triangle to the Right) 4 : Left (Triangle to the Left) 5 : Bottom (Triangle to the Bottom)	EN	0, *
Category of Notice Mark	(catnmk)	1 : (A.1) No Entry (General Sign) 2 : (A.1.1) Sections Closed to Use, No Entry Except for Non-Motorized Small Craft 3 : (A.2) No Overtaking 4 : (A.3) No Overtaking of Convoys by Convoys 5 : (A.4) No Passing or Overtaking 6 : (A.5) No Berthing on the Side of the Waterway on Which the Sign is Placed 7 : (A.5.1) No Berthing on the Stretch of Water Whose Breadth, Measured from the Sign, is Shown in Metres on the Sign 8 : (A.6) No Anchoring or Trailing of Anchors, Cables or Chains 9 : (A.7) No Making Fast to the Bank 10 : (A.8) No Turning 11 : (A.9) Do Not Create Wash 12 : (A.10) No Passing on Left Side (In Openings of Bridges or Weirs) 13 : (A.10) No Passing on Right Side (In Openings of Bridges or Weirs)	EN	1, 1

		<p>14 : (A.12) Motorized Craft Prohibited</p> <p>15 : (A.13) Sports and Pleasure Craft Prohibited</p> <p>16 : (A.14) Water Skiing Prohibited</p> <p>17 : (A.15) Sailing Vessels Prohibited</p> <p>18 : (A.16) All Craft Other Than Motorized Vessels or Sailing Craft Prohibited</p> <p>19 : (A.17) Use of Sailboards Prohibited</p> <p>20 : (A.20) Water Bikes Prohibited</p> <p>21 : (A.18) End of Zone Authorized for High Speed Navigation of Small Sport and Pleasure Craft</p> <p>22 : (A.19) No Launching or Beaching of Vessels</p> <p>23 : (B.1) Proceed in Left Direction</p> <p>24 : (B.1) Proceed in Right Direction</p> <p>25 : (B.2a) Move to the Side of the Fairway on Your Port Side</p> <p>26 : (B.2b) Move to the Side of the Fairway on Your Starboard Side</p> <p>27 : (B.3a) Keep on the Side of the Fairway on Your Port Side</p> <p>28 : (B.3b) Keep on the Side of the Fairway on Your Starboard Side</p> <p>29 : (B.4a) Cross Fairway to Port</p> <p>30 : (B.4b) Cross Fairway to Starboard</p> <p>31 : (B.5) Stop as Prescribed in the Regulations</p> <p>32 : (B.6) Do Not Exceed the Speed Indicated (in km/h)</p> <p>33 : (B.7) Give a Sound Signal</p> <p>34 : (B.8) Keep a Particularly Sharp Lookout</p> <p>35 : (B.9a) Do Not Enter the Main Waterway Until Certain that This Will Not Oblige Vessels Proceeding On It to Change their Course or Speed</p> <p>36 : (B.9b) Do Not Cross the Main Waterway Until Certain that This Will Not Oblige Vessels Proceeding On It to Change their Course or Speed</p> <p>37 : (B.11) Obligation to Enter Into a Radiotelephone Link on</p>	
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		<p>the Channel as Indicated on the Board</p> <p>38 : (C.1) Depth of Water Limited</p> <p>39 : (C.2) Headroom Limited</p> <p>40 : (C.3) Width of Passage or Channel Limited</p> <p>41 : (C.4) There Are Restrictions on Navigation</p> <p>42 : (C.5) The Channel Lies at a Distance From the Left Bank</p> <p>43 : (C.5) The Channel Lies at a Distance From the Right Bank</p> <p>44 : (D.1a) Recommended Channel in Both Directions</p> <p>45 : (D.1b) Recommended Channel Only in the Direction Indicated, Passage in the Opposite Direction Prohibited (at Bridges)</p> <p>46 : (D.2) You are Recommended to Keep on Right Side (in Openings of Bridges and Weirs)</p> <p>47 : (D.2) You are Recommended to Keep on Left Side (in Openings of Bridges and Weirs)</p> <p>48 : (D.3) You Are Recommended to Proceed in the Left Direction</p> <p>49 : (D.3) You Are Recommended to Proceed in the Right Direction</p> <p>50 : (E.1) Entry Permitted (General Sign)</p> <p>51 : (E.2) Overhead Cable Crossing</p> <p>52 : (E.3) Weir</p> <p>53 : (E.4a) Ferry-Boat Not Moving Independently</p> <p>54 : (E.4b) Ferry-Boat Moving Independently</p> <p>55 : (E.5) Berthing (that is Anchoring or Making Fast to the Bank) Permitted</p> <p>56 : (E.5.1) Berthing Permitted on the Stretch of Water of the Breadth Measured From, and Shown on the Board in Metres</p> <p>57 : (E.5.2) Berthing Permitted on the Stretch of Water Bounded by the Distances Measured From, and Shown on the Board in Metres</p>		
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		58 : (E.5.3) Maximum Number of Vessels Permitted to Berth Abreast 59 : (E.5.4) Berthing Area Reserved for Pushing-Navigation Vessels that are Not Required to Carry Blue Lights or Blue Cones 60 : (E.5.5) Berthing Area Reserved for Pushing-Navigation Vessels that are Required to Carry One Blue Light or One Blue Cone 61 : (E.5.6) Berthing Area Reserved for Pushing-Navigation Vessels that are Required to Carry Two Blue Lights or Two Blue Cones 62 : (E.5.7) Berthing Area Reserved for Pushing-Navigation Vessels that are Required to Carry Three Blue Lights or Three Blue Cones 63 : (E.5.8) Berthing Area Reserved for Vessels Other Than Pushing-Navigation Vessels that are Not Required to Carry Blue Lights or Blue Cones 64 : (E.5.9) Berthing Area Reserved for Vessels Other Than Pushing-Navigation Vessels that are Required to Carry One Blue Light or One Blue Cone 65 : (E.5.10) Berthing Area Reserved for Vessels Other Than Pushing-Navigation Vessels that are Required to Carry Two Blue Lights or Two Blue Cones 66 : (E.5.11) Berthing Area Reserved for Vessels Other Than Pushing-Navigation Vessels that are Required to Carry Three Blue Lights or Three Blue Cones 67 : (E.5.12) Berthing Area Reserved for All Vessels that are Not Required to Carry Blue Lights or Blue Cones 68 : (E.5.13) Berthing Area Reserved for All Vessels that are Required to Carry One Blue Light or One Blue Cone 69 : (E.5.14) Berthing Area Reserved for All Vessels that are Required to Carry		
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		<p>Two Blue Lights or Two Blue Cones</p> <p>70 : (E.5.15) Berthing Area Reserved for All Vessels that are Required to Carry Three Blue Lights or Three Blue Cones</p> <p>71 : (E.6) Anchoring or Trailing of Anchors, Cables or Chains Permitted</p> <p>72 : (E.7) Making Fast to the Bank Permitted</p> <p>73 : (E.7.1) Berthing Area Reserved for Loading and Unloading of Vehicles</p> <p>74 : (E.8) Turning Area</p> <p>75 : (E.9a) Crossing With Secondary Waterway Ahead</p> <p>76 : (E.9b) Secondary Waterway Ahead on the Right</p> <p>77 : (E.9c) Secondary Waterway Ahead on the Left</p> <p>78 : (E.9d) Secondary Waterway Ahead, Main Waterway on the Right</p> <p>79 : (E.9e) Secondary Waterway Ahead, Main Waterway on the Left</p> <p>80 : (E.9f) Secondary Waterway on the Left, Main Waterway on the Right</p> <p>81 : (E.9g) Secondary Waterway on the Right, Main Waterway on the Left</p> <p>82 : (E.9h) Secondary Waterway Ahead and on the Left, Main Waterway on the Right</p> <p>83 : (E.9i) Secondary Waterway Ahead and on the Right, Main Waterway on the Left</p> <p>84 : (E.10a) Crossing with Main Waterway Ahead</p> <p>85 : (E.10b) Main Waterway Ahead</p> <p>86 : (E.10c) Junction with Main Waterway Ahead and Right</p> <p>87 : (E.10d) Junction with Main Waterway Ahead and Left</p> <p>88 : (E.10e) Junction with Main Waterway Ahead and Right, Secondary Waterway on the Left</p> <p>89 : (E.10f) Junction with Main Waterway Ahead and Left, Secondary Waterway on the Right</p>		
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		<p>90 : (E.11) End of Prohibition or Obligation Applying to Traffic in One Direction Only, or End of a Restriction</p> <p>91 : (E.13) Drinking Water Supply</p> <p>92 : (E.14) Telephone</p> <p>93 : (E.15) Motorized Vessels Permitted</p> <p>94 : (E.16) Sport and Pleasure Craft Permitted</p> <p>95 : (E.17) Water Skiing Permitted</p> <p>96 : (E.18) Sailing Vessels Permitted</p> <p>97 : (E.19) Craft Other Than Motorized Vessels or Sailing Craft Permitted</p> <p>98 : (E.20) Use of Sailboards Permitted</p> <p>99 : (E.23) Possibility of Obtaining Nautical Information by Radiotelephone on the Channel Indicated</p> <p>100 : (E.24) Water Bikes Permitted</p> <p>101 : (E.21) Zone Authorized for High Speed Navigation of Small Sport and Pleasure Craft</p> <p>102 : (E.22) Launching or Beaching of Vessels Permitted</p> <p>103 : (BR) Proceed Close to the Margin on Your Port Side</p> <p>104 : (BR) Proceed Close to the Margin on Your Starboard Side</p> <p>105 : (BR) Proceed in the Middle of the River</p> <p>106 : (BR) Cross River to Port</p> <p>107 : (BR) Cross River to Starboard</p> <p>108 : (BR) Traffic Between Margins</p> <p>109 : (BR) Reduce Speed</p> <p>110 : Wreck Pontoon, Passage Allowed on Side Showing Red-White Sign</p> <p>111 : Wreck Pontoon, Passage Allowed on Both Sides</p> <p>112 : No Passing or Overtaking of Convoys</p> <p>113 : Small Crafts Prohibited</p> <p>114 : Attention! (Keep Caution)</p> <p>115 : Fairway Crossing</p> <p>116 : Shipping Inspection Point</p> <p>117 : (E.25) Electrical Power Supply Point</p> <p>118 : (E.26) Winter Harbour</p>	
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		119 : (E.26.1) Maximum Number of Vessels Permitted to Berth in Winter Harbour 120 : (E.27) Winter Shelter 121 : (E.27.1) Maximum Number of Vessels Permitted to Berth in Winter Shelter; Maximum Number of Vessels Permitted to Berth Abreast; Maximum Number of Rows of Vessels Which are Berthed Abreast 122 : (E.6.1) Use of Spuds Permitted 123 : (B.12) Obligation to Use Onshore Power Supply Point 124 : (BR) Right Pillar In Passage For Tiete-Parana Waterway 125 : (BR) Left Pillar In Passage For Tiete-Parana Waterway 126 : (BR) Best Transit Point 127 : (BR) Mandatory Stopping Point for Tiete-Parana Waterway 128 : (A.4.1) No Passing or Overtaking of Convoys by Convoys		
Direction of Impact	(dirimp)	1 : Upstream 2 : Downstream 3 : To the Left Bank 4 : To the Right Bank 5 : To Harbour	EN	0, *
Distance of Impact, Downstream	(disipd)	[xxxx] (metres), e.g., 2120	IN	0, 1
Distance of Impact, Upstream	(disipu)	[xxxx] (metres), e.g., 2120	IN	0, 1
Distance From Notice Mark, First	(disbk1)		RE	0, 1
Distance From Notice Mark, Second	(disbk2)		RE	0, 1
Function of Notice Mark	(fnctnm)	1 : Prohibition Mark 2 : Regulation Mark 3 : Restriction Mark 4 : Recommendation Mark 5 : Information Mark	EN	1, 1
Marks Navigational - System Of	(MARSYS)	1 : IALA A 2 : IALA B 9 : No System 10 : Other System 11 : Main European Inland Waterway Marking System 12 : Russian Inland Waterway Regulations 13 : Brazilian National Inland Waterway Regulation 15 : Paraguay-Parana Waterway - Brazilian Complementary Aids	EN	0, 1
Orientation Value	(ORIENT)	[xxx.xx or "unknown"] (degree (°)), e.g., 110.76	RE	0, 1

Status	(STATUS)	2 : Occasional 3 : Recommended 4 : Not in Use 5 : Periodic/Intermittent 8 : Private 9 : Mandatory 12 : Illuminated 14 : Public 16 : Watched 17 : Unwatched 18 : Existence Doubtful	EN	0, *
Bank of the Waterway	(bnkwtw)	1 : Left 2 : Right	EN	0, 1
Condition	(CONDTN)	1 : Under Construction 2 : Ruined 5 : Planned Construction	EN	0, 1
<i>feature name</i>		See clause 2.5.8	C	0, *
language		ISO 639-2/T	(S) TE	1, 1
name	(OBJNAM) (NOBJNM)		(S) TE	1, 1
name usage		1 : default name display 2 : alternate name display	(S) EN	0, 1 †
Scale Minimum	(SCAMIN)	[BR: 50000, EUR: 22000, US: 60000] or see clause 2.5.9	IN	1, 1
<i>Fixed Date Range</i>			C	0, 1
Date End	(DATEND)		(S) TD	0, 1
Date Start	(DATSTA)		(S) TD	0, 1
<i>Periodic Date Range</i>			C	0, *
Date End	(DATEND)		(S) TD	1, 1
Date Start	(DATSTA)		(S) TD	1, 1
Reported Date	(SORDAT)		TD	0, 1
MMSI Code	(mmsico)	[xxxxxxxx] (e.g., 366777490)	TE	0, 1
Information	(INFORM)		C	0, *
File Locator			(S) TE	0, 1
File Reference	(TXTDSC)		(S) TE	0, 1
Headline			(S) TE	0, 1
Language			(S) TE	1, 1
Text	(INFORM) (NINFOM)		(S) TE	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military	(S) EN	0, 1

		10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0, *
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Component	Notice Mark Aggregation (see clause 0)	Caution Area, Communication Area, Pylon/Bridge Support, Radio Calling-In Point, Restricted Area, Structure Over Navigable Water, Turning Basin, Vehicle Transfer	Association	0,*
The Component	Bridge Aggregation (see clause 25.3)	Bridge	Association	0,*
The Component	Overhead Cable Aggregation (see clause 0)	Cable Overhead	Association	0,*
The Component	Overhead Pipeline Aggregation (see clause 0)	Pipeline Overhead	Association	0,*
The Component	Lock Aggregation (see clause 25.23)	Lock Basin	Association	0,*
The Component	Anchorage Or Berth Aggregation (see clause 25.18)	Anchorage Area, Anchor Berth, Berth, Mooring Area	Association	0,*
The Component	Barrage Association (see clause 0)	Dam	Association	0,*

The Component	Exceptional Navigation Structure Aggregation (see clause 0)	Exceptional Navigation Structure	Association	0,*
The Component	Tunnel Aggregation (see clause 25.27)	Tunnel	Association	0,*
The Updated Object	Updated Information (see clause 25.17)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Spatial Association (see clause 25.11)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

Inland specific encoding instructions:

- A) For detailed list of all available input ID's for **category of notice mark** (catnmk) see annexes "AA - main European inland waterway marking system", "AB - Russian Inland Waterways", "AC - Brazilian".
- B) Although the list was originally based on the main European inland waterway marking system, the codes can be used for other **Notice Marks** with the same meaning (e.g., on the Paraguay-Parana Waterway in Brazil).
- C) For notice marks as described in Annex AA: The **function of notice mark** (fnctnm) has to be encoded for display purposes as follows: 1 (prohibition mark, signs A), 2 (regulation mark, signs B), 3 (restriction mark, signs C), 4 (recommendation mark, signs D), 5 (information mark, signs E).
- D) For notice marks as described in Annex AA: If the notice mark is positioned rectangular to the bank, it can be seen only by vessels heading upstream (**direction of impact** (dirimp) = 1) or by vessels heading downstream (**direction of impact** (dirimp) = 2).
If the notice mark is positioned parallel to the bank, it can be seen by vessels heading upstream as well as vessels heading downstream. In this case, the direction of impact is defined by triangular additional marks.
- E) For notice marks as described in Annex AA: The **distance of impact, downstream** (disipd) or the **distance of impact, upstream** (disipu) can be defined by the distance between two notice marks, by a number, which is shown on the top board or by a number, which is shown on an triangular additional mark.
- F) For notice marks as described in Annex AA: The minimum distance of impact from the notice mark rectangular to the bank, **distance from notice mark, first** (disbk1) can be defined by:
 1. the number on a sign C.5 (distance of the waterway from the bank),
 2. the first number on a sign E.5.2 (berthing permitted between two distances).
- G) For notice marks as described in Annex AA: The maximum distance of impact from the notice mark rectangular to the bank, **distance from notice mark, second** (disbk2) can be defined by:
 3. the number on a sign A.5.1 (berthing prohibited within the breadth indicated),
 4. the number on a sign E.5.1 (berthing permitted within the distance indicated),
 5. the second number on a sign E.5.2 (berthing permitted between two distances).
- H) For notice marks as described in Annex AA: Rectangular boards on top of the main sign ('addmrk' = 1) are showing the distance at which the regulation applies or the special feature indicated by the notice mark is to be found.

Rectangular boards at the bottom of the main sign (**additional mark** (addmrk) = 2) are showing explanations or additional information.

Triangular pointers at the side of the main sign (**additional mark** (addmrk) = 3 or 4) are showing the direction of the section to which the notice mark applies.

Triangular pointers at the bottom (**additional mark** (addmrk) = 5) are showing the distance from the shore, within which the regulation applies.

The attribute **additional mark** (addmrk) is only defining the position and shape of the additional mark. The content is given by other attributes (**distance of impact**, **downstream** (disipd), **distance of impact**, **upstream** (disipu), **distance from notice mark**, **first** (disbk1), **distance from notice mark**, **second** (disbk2), **information** (INFORM))

- I) For notice marks as described in Annex AA: If the system of navigational marks of a special sign is different from the system mentioned in the metadata feature **Navigational System of Marks** (m_nsyst), or there is no such metadata feature in the cell, the attribute **marks navigational – system of (MARSYS)** must be used.
- J) For notice marks as described in Annex AA: If a notice mark is illuminated, this should be indicated by the attribute **status** (STATUS) = 12).
- K) For notice marks as described in Annex AA: Explanations or additional information shown on additional marks and
 - 1. the number shown on the signs B.6 (maximum speed limit) amended by the unit (e.g., "10 km/h"),
 - 2. the frequency band and the number shown on the sign B.11 (mandatory radiophone channel) and E.23 (nautical radio information channel) (e.g., "VHF 11"),
 - 3. the number shown on the signs C.1 (restricted fairway depth), C.2 (restricted vertical clearance), C.3 (restricted width of the fairway or passage), and E.5.3 (maximum number of vessels berthing abreast)

have to be indicated in the **information** (INFORM) attribute.

If the sign E.5.3 is used as an additional mark, the text "maximum x vessels berthing abreast" should be used. The maximum number of vessels berthing abreast has to be indicated in arabic numbers.

- L) For notice marks as described in Annex AA: The standard **scale minimum** (SCAMIN) value for notice marks is 22000. Different values can be used to improve the display with regard to the safety of navigation.
- M) For notice marks as described in Annex AA: For more detailed information regarding Notice Marks and which marks should be accompanied by area features, see Annex AA, Notice Marks for more detailed information.
- N) For notice marks as described in Annex AA: To encode an area, where notice marks apply, features such as **Restricted Area** (resare), **Turning Basin** (trnbsn) or **Caution Area** (CTNARE), **Communication Area** (comare) must be associated using a **Notice Mark Aggregation**. For **Anchorage Area**, **Anchor Berth** and **Berth** the **Notice Marks** must be associated to an **Anchorage Or Berth Aggregation**.
- O) For notice marks as described in Annex AA: Signs with textual description, which have the same meaning as a sign (for example a white board with the text "mooring prohibited") can be encoded as notice marks with **information** (INFORM) = "textual description only".
- P) For notice marks as described in Annex AA: Signs, which are installed by private companies, should be encoded with **status** (STATUS) = 8 (private).

- Q) For notice marks as described in Annex AA: If the chart producer wants to ensure that a **Notice Mark** is displayed correctly, if detailed symbolization is used instead of the generalized symbols, **orientation value** (ORIENT) has to be encoded.
- R) For notice marks as described in Annex AA on bridges: The attribute **orientation value** (ORIENT) must be used to rotate the symbol according the orientation of the bridge. **Orientation value** at bridges should correspond to the prescribed heading of the vessels.
- S) For notice marks as described in Annex AA on bridges: If a **Notice Mark** is illuminated, this should be indicated by the attribute **status** (STATUS) = 12, e.g. at bridges). If the signs A.1, D.1 and D.2 are not illuminated, but the corresponding lights are shown by night, the attribute **status** (STATUS) = 12 can be used, too. If it is important for the safety of navigation to indicate the existence of the lights on the chart (e.g. to prevent confusion with other lights), **Light all around** (LIGHTS) can be used instead of the attribute (see 19.2).
- T) For notice marks as described in Annex AA on bridges: The **scale minimum** (SCAMIN) value 8000 should be used. Different values may be used to improve the display with regard to the safety of navigation.
- U) For notice marks as described in Annex AA on bridges: This feature must be aggregated to a bridge by a **Bridge Aggregation**.
- V) BR: The **function of notice mark** (fnctnm) has to be encoded.
- W) BR: The attribute **bank of the waterway** (bnkwtw) must be encoded for display purposes when adopting **marks navigational – system of** (MARSYS) = 13 (Brazilian national inland waterway regulation) or 15 (Paraguay-Parana waterway - Brazilian complementary aids). It indicates the board colours.
- X) BR: The attribute **orientation value** (ORIENT) must be used to rotate the symbol according the orientation of the board for all Brazilian notice marks.
- Y) BR: The **direction of impact** attribute (dirimp) must be used to define if the notice mark is addressed to vessels heading upstream or downstream.

	◀ Triangle left side	Triangle right side ►
Left bank (downstream)	direction of impact = 1	direction of impact = 2
Right bank (downstream)	direction of impact = 2	direction of impact = 1

Diagrams for Brazilian national inland waterway regulations – two sides

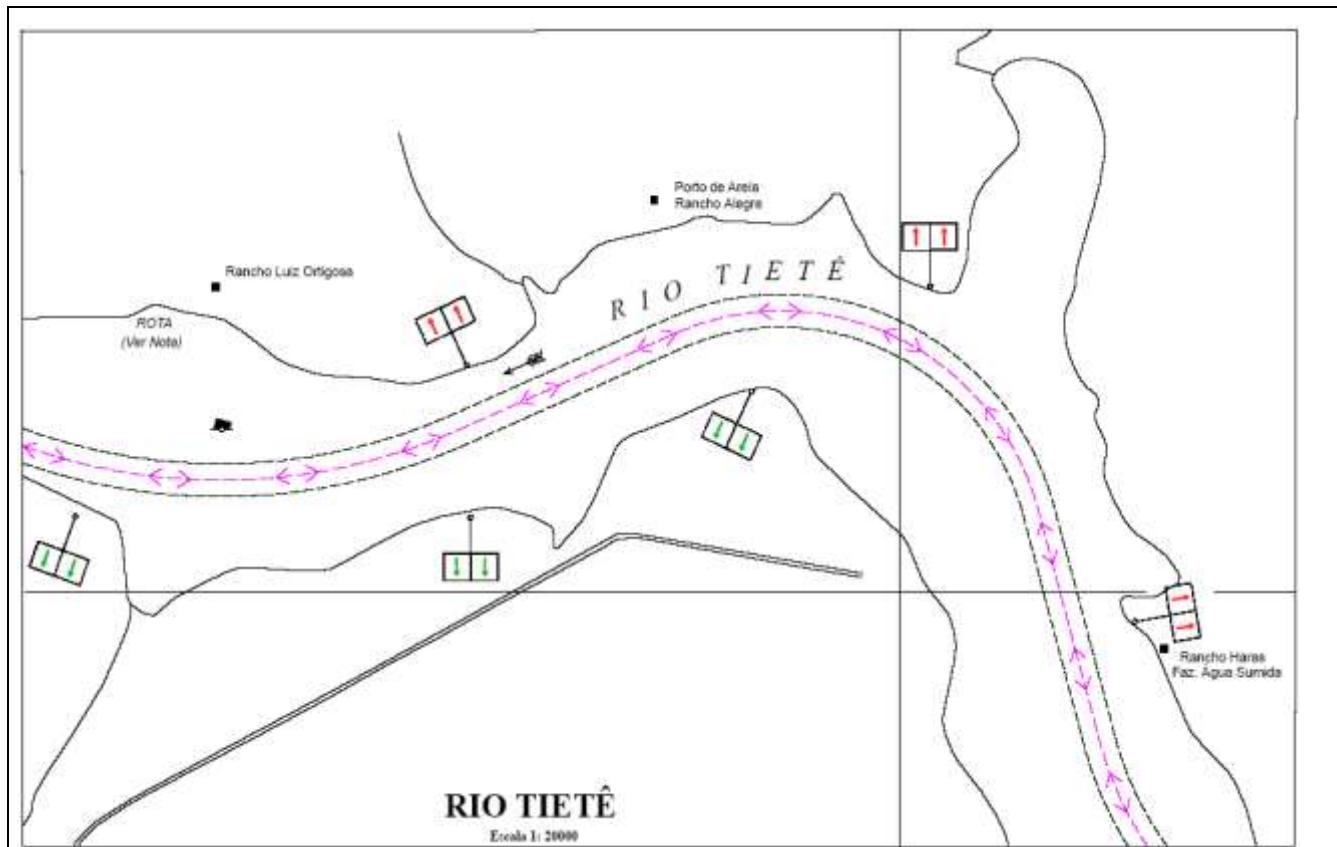


Diagram for Brazilian national inland waterway regulations – side independent

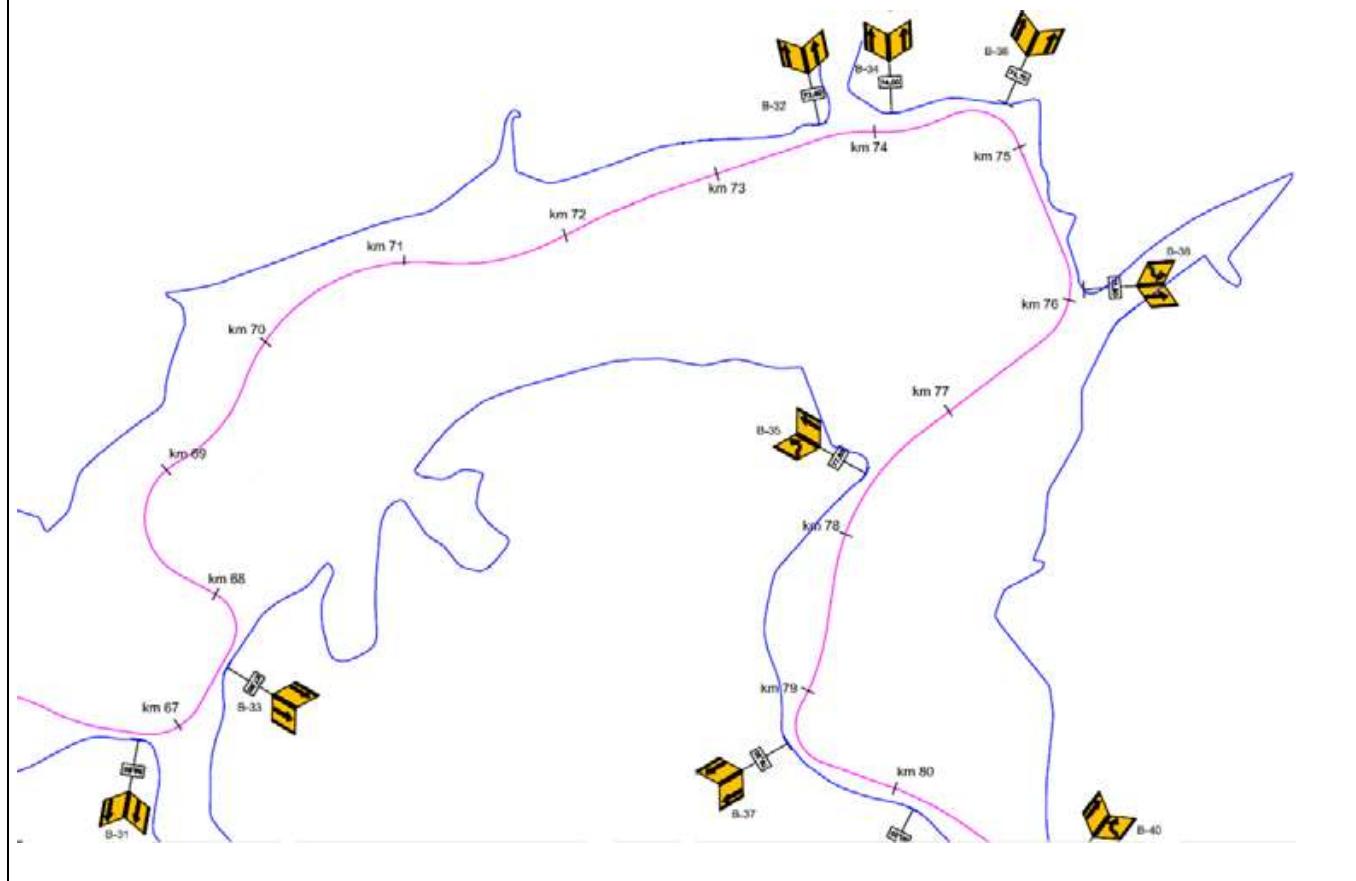
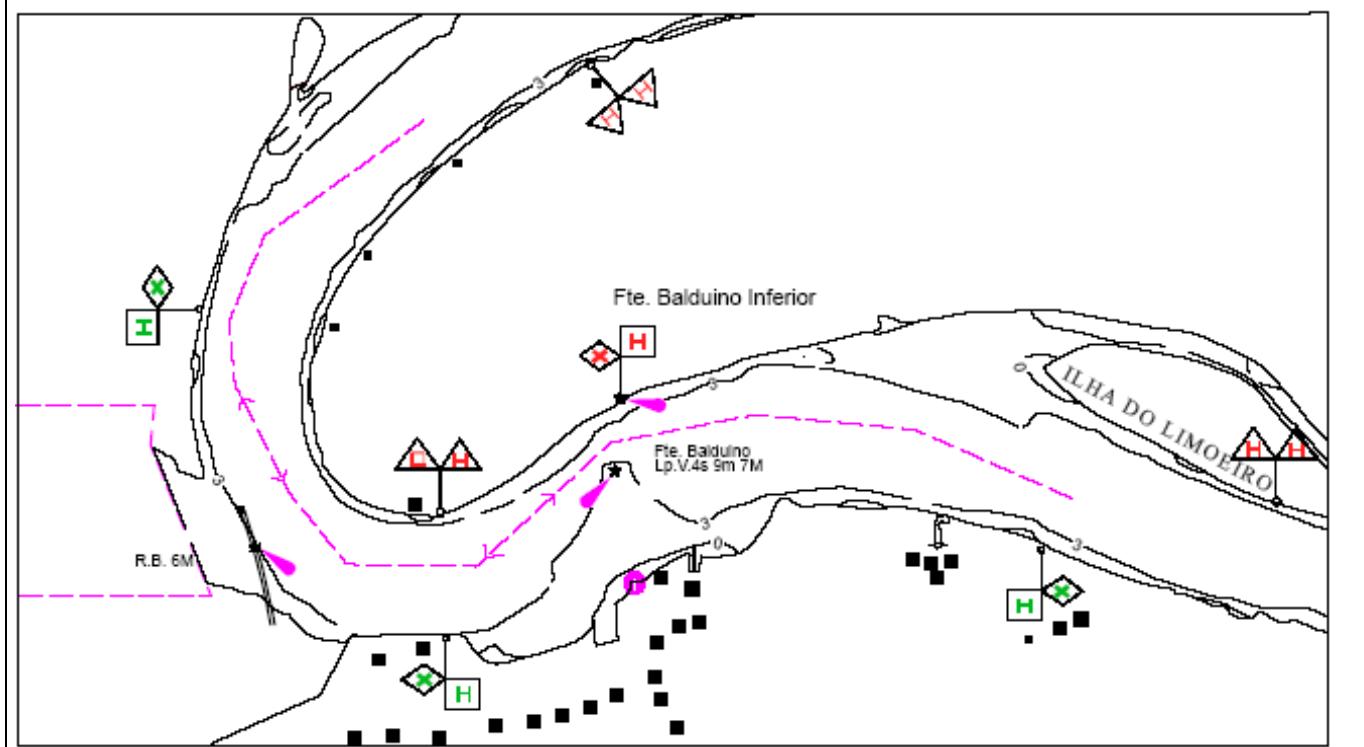


Diagram for Paraguay-Parana waterway - Brazilian complementary aids



20.18 Buoy Line

IHO Definition: A **buoy line** is a set of buoys positioned on a curve indicating a certain restriction.

S-401 Geo Feature: Buoy Line (M)

Primitives: Curve

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
 				
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
direction of impact	(DIRIMP)	1 : Upstream 2 : Downstream 3 : To the Left Bank 4 : To the Right Bank 5 : To Harbour	EN	0,*
information		See clause 2.4.6	C	0,*
file locator			(S)TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S)TE	0,1
headline			(S)TE	0,1
language		ISO 639-2/T	(S)TE	1,1
text	(INFORM) (NINFORM)		(S)TE	0,1
restriction	(RESTRN)	7 – Entry prohibited	EN	0,*
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
scale minimum	(SCAMIN)	[EUR: 22000, or see clause 2.5.9]	IN	1,1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1

<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 †
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*
† For each instance of information , at least one of the sub-attributes file reference or text must be populated.				
Complex attribute feature name , sub-attribute name usage is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.				

Distinction: Cardinal Buoy, Lateral Buoy

Inland specific Encoding Instructions:

21 Geo Features – Radar, Radio

21.1 Automatic Identification System (AIS) aids to navigation

AIS signals used as an aid to navigation may:

- actually be transmitted from a physical aid to navigation, or appear to be transmitted from a physical aid to navigation but is actually transmitted from an AIS base station (Physical AIS aid to navigation); or
- be transmitted from an AIS base station to represent an aid to navigation where a physical aid to navigation does not exist (Virtual AIS aid to navigation).

It is not required to encode AIS information on IENCs, as IENCs are intended to be used in conjunction with Inland ECDIS or ECS, in which AIS targets are displayed when in range. However, producers may wish to indicate the presence of a physical AIS aid to navigation to aid in the route planning process or for use in ECS or other navigation systems.

21.2 Physical AIS aid to navigation

IHO Definition: **PHYSICAL AIS AID TO NAVIGATION.** An Automatic Identification System (AIS) message 21 transmitted from a physical Aid to Navigation, or transmitted from an AIS station for an Aid to Navigation which physically exists. (Adapted from IALA Recommendation A-126).

S-401 Geo Feature: Physical AIS Aid to Navigation (C)

Primitives: Point

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
<i>estimated range of transmission</i>	(ESTRNG)		RE	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
<i>fixed date range</i>		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
MMSI code		Unique 9 digit code	TE	0,1
<i>periodic date range</i>		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
status	(STATUS)	1 : permanent 5 : periodic/intermittent 7 : temporary	EN	0,1
scale minimum	(SCAMIN)	[60000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 [†]
Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1

<i>Source Indication</i>			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
<i>.....Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
<i>....Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 †
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity

The Equipment	Structure/Equipment (see clause 25.12)	Cardinal Beacon, Cardinal Buoy, Bridge, Building, Crane, Conveyor, Daymark, Dolphin, Emergency Wreck Marking Buoy, Exceptional Navigation Structure, Fishing Facility, Floating Dock, Fortified Structure, Hulk, Installation Buoy, Isolated Danger Beacon, Isolated Danger Buoy, Landmark, Lateral Beacon, Lateral Buoy, Mooring Buoy, Offshore Platform, Pile, Pipeline Overhead, Pontoon, Pylon/Bridge Support, Safe Water Beacon, Safe Water Buoy, Shoreline Construction, Silo/Tank, Span Fixed, Span Opening, Special Purpose/General Beacon, Special Purpose/General Buoy, Structure Over Navigable Water, Wind Turbine, Wreck	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*
<p>[†] Complex attribute feature name, sub-attribute name usage is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.</p> <p>For each instance of fixed date range, at least one of the sub-attributes date end or date start must be populated.</p> <p>For each instance of information, at least one of the sub-attributes file reference or text must be populated.</p>				
<p>21.2.1 Physical Automatic Identification System (AIS) aids to navigation If it is required to encode a physical AIS aid to navigation, it must be done using the feature Physical AIS Aid to Navigation.</p> <p>Remarks:</p> <ul style="list-style-type: none"> Physical AIS aids to navigation must be encoded, where required, using the geometry of the physical aid to navigation from which the AIS signal is, or appears to be, transmitted. If it is required to encode the actual location from which the signal is transmitted for a physical AIS aid to navigation where the signal is transmitted from another location, it must be done using a Radio Station feature (see clause 21.3), with attribute category of radio station = 16 (AIS base station). The unique Maritime Mobile Service Identity (MMSI) code for the physical AIS aid to navigation should be encoded, where known, using the attribute MMSI code. 				

- Where populated, the attribute **estimated range of transmission** for **Physical AIS Aid to Navigation** provides the boatmaster with an approximate distance from the position of the aid that the broadcast signal will generate the display of the AIS symbol on the Inland ECDIS or ECS.

Distinction: Radar Station; Radio Station; Radio Calling-In Point.

Inland specific Encoding Instructions:

- Physical AIS aids to navigation have to be encoded as feature if they are not encoded as an attribute of another aids to navigation feature.

21.3 Radio station

IHO Definition: RADIO STATION. A place equipped to transmit radio waves. Such a station may be either stationary or mobile, and may also be provided with a radio receiver. (Adapted from IHO Dictionary – S-32).				
S-401 Geo Feature: Radio Station (RDOSTA) (O)				
Primitives: Point				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
call sign	(CALSGN)		TE	0,1
category of radio station	(CATROS)	5 : radio direction-finding station 10 : differential GNSS 11 : Toran 14 : Chaika 19 : radio telephone station 20 : AIS base station	EN	0,*
communication channel	(COMCHA)		TE	0,*
<i>estimated range of transmission</i>	(ESTRNG)		RE	0,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
frequency pair			C	0,1
frequency shore station receives			(S) IN	0,1
frequency shore station transmits	(SIGFRQ)		(S) IN	1,1
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
periodic date range		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private	EN	0,*
scale minimum	(SCAMIN)	[EUR: 22000, US: 60000]	IN	1,1

		or see clause 2.5.9		
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 [†]
Reported Date	(SORDAT)		TD	0, 1
Pictorial Representation	(PICREP)		TE	0, 1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display	(S) EN	0,1 [†]

		2 : alternate name display		
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

21.3.1 Radio stations

Transmissions from radio stations may provide boatmasters with a line of position. Most radio position fixing systems require Radio Direction Finding (RDF) equipment to determine the bearing of the transmitting device; such equipment is generally no longer fitted on vessels. The exception is “emergency use only” VHF-based direction finding services (which do not use RDF equipment). Consequently, the following radio position-fixing stations are now obsolete and there is no longer any value in encoding them on IENCs:

- Circular (non-directional) (RC), directional (RD) and rotating pattern (RW) marine radiobeacons;
- Consol beacons (Consol);
- Aeronautical radiobeacons (Aero RC);
- Radio direction-finding stations (except VHF-based emergency stations) (RG);
- Coast Radio Stations providing ‘QTG’ service (R).

The feature “radio station” is used to encode the point of transmission of the signal.

If it is required to encode a radio station, it must be done using the feature **Radio Station**.

Remarks:

- The **Radio Station** must only be used to encode the technical equipment itself, independent of the building or structure in which it is installed. If it is required to encode the building or structure (for example mast, tower, radar dome), it must be done using an appropriate feature (for example **Building**, **Landmark**). There is no requirement to establish a Structure/Equipment association between the **Radio Station** feature and the structure in which it is installed.
- Further information (for example transmission characteristic) may be encoded using the complex attribute **information** (see clause 2.4.6).
- Each VHF-channel should be indicated, using the attribute **communication channel** (see clause 27.107). Alternately, if the same VHF-channel(s) apply to multiple features in the dataset, this should be indicated through an associated instance of the information type **Contact Details**, attribute **communication channel** (see clause 24.1).
- If it is required to encode a DGPS station, it must be done using **Radio Station**, with attribute **category of radio station = 10** (Differential GNSS).

- Where required, the complex attribute **frequency pair**, sub-attributes **frequency shore station receives** and **frequency shore station transmits**, must be quoted in Hertz, for example a signal frequency of 950 MHz must be encoded as 950000000.

21.3.2 Radio direction-finding stations

If it is required to encode a radio direction-finding station, it must be done using a **Radio Station** feature, with attribute **category of radio station** = 5 (radio direction-finding station). The identification signal may be encoded using the attribute **call sign**.

Remarks:

- Direction-finding is now only provided as an emergency service by VHF.

Distinction: Physical AIS Aid to Navigation; Radar Station; Radio Calling-In Point.

Inland specific Encoding Instructions:

21.4 Radar transponder beacon

IHO Definition: **RADAR TRANSPONDER BEACON.** A transponder beacon transmitting a coded signal on radar frequency, permitting an interrogating craft to determine the bearing and range of the transponder. (IHO Dictionary – S-32).

For IENCs a radar transponder beacon (racon) may be used to indicate an entrance of a canal or a bridge passage.

S-401 Geo Feature: Radar Transponder Beacon (RTPBCN) (M)

Primitives: Point

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
				
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of radar transponder beacon	(CATRTB)	1 : ramark, radar beacon transmitting continuously 2 : racon, radar transponder beacon 3 : leading racon/radar transponder beacon	EN	1,1
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
interoperability identifier		MRN (see clause 27.161)	URN	0,1
periodic date range		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
radar wave length	(RADWAL)	(The wavelength (V) (metres) and the band code character (B)), e.g., V.VV-B	C	0,2
radar band			(S) TE	1,1
wave length value			(S) RE	1,1
sector limit			C	0,1
sector limit one	(SECTR1)		(S) C	1,1

sector bearing		sector limit one/sector bearing ≠ sector limit two/sector bearing (0 = 360)	(S) RE	1,1
sector line length			(S) RE	0,1
sector limit two	(SECTR2)		(S) C	1,1
sector bearing		sector limit two/sector bearing ≠ sector limit one/sector bearing (0 = 360)	(S) RE	1,1
sector line length			(S) RE	0,1
signal group	(SIGGRP)		TE	0,1
<i>signal sequence</i>	(SIGSEQ)		C	0,* (ordered)
signal duration			(S) RE	1,1
signal status		1 : lit/sound 2 : eclipsed/silent	(S) EN	1,1
<i>status</i>	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private	EN	0,*
<i>value of maximum range</i>	(VALMXR)		RE	0,1
scale minimum	(SCAMIN)	[EUR: 22000, US: 60000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
Condition	(CONDTN)	1 : Under Construction 2 : Ruined 3 : Under Reclamation 5 : Planned Construction	EN	0, 1
Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police	(S) EN	0, 1

		12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Equipment	Structure/Equipment (see clause 25.12)	Cardinal Beacon, Cardinal Buoy, Bridge, Building, Crane, Conveyor, Daymark, Dolphin, Emergency Wreck Marking Buoy, Exceptional Navigation Structure, Fishing Facility, Floating Dock, Fortified Structure, Hulk, Installation Buoy, Isolated Danger Beacon, Isolated Danger Buoy, Landmark, Lateral Beacon, Lateral Buoy, Mooring Buoy, Offshore Platform, Pile, Pipeline Overhead, Pontoon, Pylon/Bridge Support, Safe Water Beacon, Safe Water Buoy, Shoreline Construction, Silo/Tank, Span Fixed, Span Opening, Special Purpose/General Beacon, Special Purpose/General Buoy, Structure Over Navigable Water, Wind Turbine, Wreck	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*

The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

21.4.1 Radar beacons

Radar beacons are transmitters operating in the marine radar frequency band. The signals produce a characteristic line on a vessel's radar display enabling the boatmaster to determine their position with greater certainty than would be possible by means of a normal radar display alone.

If it is required to encode a radar beacon, it must be done using the feature **Radar Transponder Beacon**.

Remarks:

- The **Radar Transponder Beacon** must only be used to encode the technical equipment itself, independent of the building or structure in which it is installed. If it is required to encode the building or structure (for example mast, tower, radar dome), it must be done using an appropriate feature (for example **Building**, **Landmark**).
- The attribute **signal group** is used to encode Morse identification letter(s) for the radar beacon, where known.
- Leading racons are established such that, when their bearing lines are coincident on a vessel's radar display, the bearing serves to indicate the track to be followed. If it is required to encode the bearing line and the recommended track for leading racons, it must be done as described in clause 15.1. Where the bearing line coincides with a leading line defined by lights or other visual features making up a range system, navigation lines and recommended tracks must not be duplicated. NOTE: All features comprising a range system must have the same value populated for the attribute **scale minimum** (see clause 2.5.9).
- If, for some reason, the radar transponder beacon signal is obscured between certain bearings, this information should be encoded using the complex attribute **sector limit** to encode the "visible" sector, as for lights (see clause 19.3.1.1).
- The sweep period may be encoded using the complex attribute **information** (see clause 2.4.6).

Distinction: Radar Line; Radar Range; Radar Station.

Inland specific Encoding Instructions:

- A) The **signal group** (SIGGRP) is encoded using brackets to separate the individual groups. A group of signals may be a single number, a chain of numbers separated by "+", a sequence of up to 4 letters or a letter and a number.
- C) **radar wave length** (RADWAL) and **signal group** (SIGGRP) are relevant for the safety of navigation and should be encoded therefore.

22 Geo Features – Services

22.1 Pilot boarding place

IHO Definition: **PILOT BOARDING PLACE.** A location offshore where a pilot may board a vessel in preparation to piloting it through local waters. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

S-401 Geo Feature: Pilot Boarding Place (PILBOP) (O)

Primitives: Point, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of pilot boarding place	(CATPIL)	1 : boarding by pilot-cruising vessel 2 : boarding by helicopter 3 : pilot comes out from shore	EN	0,1
category of preference		1 : primary 2 : alternate	EN	0,1
communication channel	(COMCHA)	[XXXX];[XXXX];[...]	TE	0,*
destination			TE	0,*
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
interoperability identifier		MRN (see clause 27.161)	URN	0,1
periodic date range		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1

pilot movement		1 : embarkation 2 : disembarkation 3 : pilot change	EN	0,*
<i>status</i>	(STATUS)	1 : permanent 2 : occasional 5 : periodic/intermittent 6 : reserved 7 : temporary 9 : mandatory 16 : watched 17 : unwatched 28 : buoyed	EN	0,*
scale minimum	(SCAMIN)	[24000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs	(S) EN	0, 1

		12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data		
.....Source	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Component	Pilotage District Association (see clause 25.8)	Pilotage District	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

22.1.1 Pilot boarding places

For a pilot boarding place, the pilot vessel may either cruise in the area or come out on request. Off some large ports pilots on outgoing ships may be disembarked at a different location. Pilots may board from a helicopter; it is then less important for a ship to reach the exact position of the boarding place but an approximate position should still be encoded. Some pilot stations are used solely for long-distance (deep-sea) pilots. Pilots may be in constant attendance, in regular attendance at certain limited times, or available by previous arrangement only. The primary purpose of encoded pilotage information is to show the position of the facility. Because of the many variations in the service provided, the main source of information on pilotage must be in an associated publication or product.

If it is required to encode a pilot boarding place, it must be done using the feature **Pilot Boarding Place**.

Remarks:

- If it is required to encode the ship to shore or shore to ship contact information, this should be done using the attribute **communication channel**. Alternately, if the same VHF-channel(s) apply to multiple features in the dataset, this should be indicated through an associated instance of the information type **Contact Details**, attribute **communication channel** (see clause 24.1).

- If it is required to encode the area in which pilotage regulations apply, it should be done using the feature **Pilotage District** (see clause 16.19). The relationship between the pilotage district and any associated pilot boarding places should be encoded using the feature association **Pilotage District Association** (see clause 25.8).

22.1.2 Pilot stations ashore

If it is required to encode a pilot station ashore, it must be done using a **Building** or **Landmark** feature, with attribute **function** = 11 (pilot office) or 12 (pilot lookout).

Distinction: Pilotage District.

Inland specific Encoding Instructions:

- A) Use **status** (STATUS) if it is a temporary pilot boarding place.

22.2 Vessel traffic service

IHO Definition: VESSEL TRAFFIC SERVICE. The area of any service implemented by a relevant authority primarily designed to improve safety and efficiency of traffic flow and the protection of the environment. It may range from simple information messages, to extensive organisation of the traffic involving national or regional schemes. (IHO Dictionary – S-32).				
S-401 Geo Feature: Vessel Traffic Service Area (ADMARE) (M)				
Primitives: Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
scale minimum	(SCAMIN)	[90000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military	(S) EN	0, 1

		10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

† Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

22.2.1 Vessel traffic service area

If it is required to encode an area within which a competent authority provides services to vessels as part of a Vessel Traffic Service (VTS), it must be done using the feature **Vessel Traffic Service Area**. The area should be captured based on the limits of the VTS or VTS sector.

Remarks:

- Separate **Vessel Traffic Service Area** features should be captured for individual VTS sectors where appropriate.

Distinction: Administration Area; Custom Zone.

Inland specific Encoding Instructions:

22.3 Coast Guard station

<p>IHO Definition: COAST GUARD STATION. A station at which a visual/radio/radar marine watch is kept either continuously or at certain times only. (IHO Dictionary – S-32).</p> <p>S-401 Geo Feature: Coast Guard Station (CGUSTA) (O)</p> <p>Primitives: Point, Surface</p>				
<i>Real World</i> 	<i>Paper Chart Symbol</i>		<i>Inland ECDIS or ECS Symbol</i>	
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
communication channel	(COMCHA)	[[XXXX];[XXXX];...]	TE	1,*
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
interoperability identifier		MRN (see clause 27.161)	URN	0,1
is MRCC			BO	0,1
periodic date range		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 16 : watched 17 : unwatched	EN	0,*
scale minimum	(SCAMIN)	[8000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1

text	(INFORM) (NIINFORM)		(S) TE	0,1 †
Reported Date	(SORDAT)		TD	0, 1
Pictorial Representation	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, NonStandard Working Day, Service Hours, Nautical Information, Time Schedule In General	Association	0,*

-	Spatial Association (see clause 25.15)	Spatial Quality	Association	0,*
[†] Complex attribute feature name , sub-attribute name usage is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.				
For each instance of fixed date range , at least one of the sub-attributes date end or date start must be populated.				
For each instance of information , at least one of the sub-attributes file reference or text must be populated.				
<p>22.3.1 Coast Guard stations</p> <p>The organisation of coast-watching and rescue services differs from country to country. For charting purposes it is assumed that two distinct functions can be recognised, even though they may be parts of the same organisation co-ordinating and effecting life saving and performing other services. Coast Guard stations are stations at which a watch is kept either continuously, or at certain times only. They are sited so as to have a commanding view, are often associated with signal stations, and are visually prominent. They are also referred to as watch-keeping stations.</p> <p>Coast Guard stations are located along the coasts of most maritime nations. Their primary purpose in former days was to enforce customs regulations, observe the movements of ships and to watch for signs of distress at sea. These functions are largely superseded by modern telecommunications and Search & Rescue (SAR) arrangements, coordinated by regional Maritime Rescue and Coordination Centres (MRCC).</p> <p>If it is required to encode a Coast Guard station, it must be done using the feature Coast Guard Station.</p> <p><u>Remarks:</u></p> <ul style="list-style-type: none"> • Many modern Coast Guard services no longer maintain visual watch from fixed stations. However, because stations were usually situated so as to have a commanding view and may therefore be visually prominent and make good fixing marks, the buildings may still be encoded as Building or Landmark. • The Coast Guard Station must only be used to describe the function of the Coast Guard station, independent of the building or structure itself. If it is required to encode the building or structure in which the Coast Guard station operates, it must be done using an appropriate feature (for example Building, Landmark). • Maritime Rescue and Coordination Centres (MRCC) are part of a constantly manned communications watch system. If it is required to encode a MRCC, it should be done using Coast Guard Station, with the Boolean attribute is MRCC = True. The name of the station may be populated using the complex attribute feature name (sub-attribute name), for example <i>MRCC Swansea</i>. • Each VHF-channel should be indicated, using the attribute communication channel (see clause 27.107). Alternately, if the same VHF-channel(s) apply to multiple features in the dataset, this should be indicated through an associated instance of the information type Contact Details, attribute communication channel (see clause 24.1). <p><u>Distinction:</u> Building; Rescue Station.</p>				

Inland specific Encoding Instructions:

- A) If a structured external XML-file with more detailed communication information is available, the reference to the file has to be entered in the **file reference** (TXTDSC) attribute.
- B) Use **ststatus** (STATUS) if any of the conditions apply.

22.4 Warning signal station

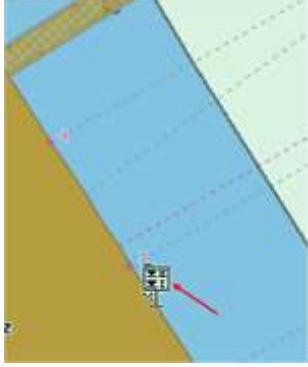
IHO Definition: **WARNING SIGNAL STATION.** A warning signal station is a place on shore from which warning signals are made to ships at sea. (Adapted from IHO Dictionary – S-32 and Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2012).

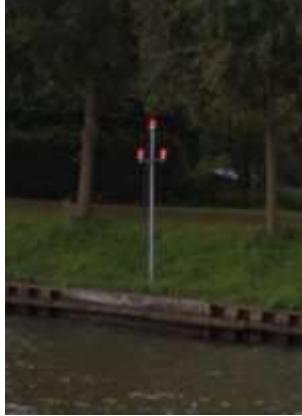
For IENCs this includes

- Depth Indicator: Device that shows the real water depth between the actual water level and the bottom of the waterway or isolated dangers under water (e.g., ground sill). The manner in which the device indicates this can either be analog (e.g., by a water level staff / pole - one can read the real water depth directly at the water level) or digital (e.g. by a display).
- External indicator of a gauge, also if the indicator is not directly located at the gauge – this is not the same as a depth indicator (values at gauges are always referred to the zero point of the gauge).
- High Water Mark: Device that shows if official high water levels are reached. This can be indicated either by analogue (e.g., by signs like a staff gauge) or digital (e.g., by a display).
- A signal station showing a warning if an outlet of water (e.g. from a pumping station) causes a current.

S-401 Geo Feature: Signal Station Warning (sistaw) (C)

Primitives: Point, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol
 <i>Depth indicator</i>		 <i>High water mark</i>
 <i>High water mark</i>		
 <i>High water mark</i>		



Warning: possible current because of outlet of water

S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of signal station, warning	(CATSIW)	1 : danger 2 : maritime obstruction 3 : cable 4 : military practice 5 : distress 6 : weather 7 : storm 8 : ice warning 9 : time 10 : tide 11 : tidal stream 12 : tide gauge 13 : tide scale 14 : diving 15 : water level gauge 16 : vertical clearance indication 18 : depth indication	EN	1,*
<i>communication channel</i>	(COMCHA)		TE	0,*
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
<i>fixed date range</i>		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>periodic date range</i>		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1

<i>status</i>	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 12 : illuminated 14 : public 15 : synchronized 16 : watched 17 : unwatched	EN	0,*
scale minimum	(SCAMIN)	[8000, for signal stations warning of possible current because of outlet of water EUR: 22000, US: 45000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 [†]
Condition	(CONDTN)	1 : Under Construction 2 : Ruined 3 : Under Reclamation 5 : Planned Construction	EN	0, 1
Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed	(S) EN	0, 1

		9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data		
.....Source	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Collection	Depth and Clearance Indicator Association (see clause 25.21)	Signal Station Warning	Aggregation	0,*
The Component	Depth and Clearance Indicator Association (see clause 25.21)	Signal Station Warning, Waterway Gauge	Association	0,*
The Component	Barrage Association (see clause 0)	Dam	Association	0,*
The Component	Exceptional Navigation Structure Aggregation (see clause 0)	Exceptional Navigation Structure	Association	0,*
The Component	Lock Aggregation (see clause 25.23)	Lock Basin	Association	0,*
The Component	Tunnel Aggregation (see clause 25.27)	Tunnel	Association	0,*
The Component	Signal Station Aggregation (see clause 25.27)	Bunker Station, Harbour Basin, Terminal	Aggregation	0,*
The Equipment	Structure/Equipment (see clause 25.12)	Cardinal Beacon, Cardinal Buoy, Bridge, Building, Crane, Conveyor, Daymark, Dolphin, Emergency Wreck Marking Buoy, Exceptional Navigation Structure, Fishing Facility, Floating Dock, Fortified Structure, Hulk, Installation Buoy, Isolated Danger Beacon, Isolated Danger Buoy, Landmark, Lateral Beacon, Lateral Buoy, Mooring Buoy, Offshore Platform, Pile, Pipeline Overhead, Pontoon, Pylon/Bridge Support, Safe Water Beacon, Safe Water Buoy, Shoreline Construction, Silo/Tank, Span Fixed, Span Opening, Special Purpose/General Beacon, Special	Association	0,*

		Purpose/General Buoy, Structure Over Navigable Water, Wind Turbine, Wreck		
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

22.4.1 Warning signal stations

Signal stations communicating visually have declined in importance. They are encoded on the largest optimum display scale IENC data not only for their main role of signalling information and instructions but also as a form of landmark. The signals generally exhibit lights by day and night but may display shapes or flags by day.

If it is required to encode a warning signal station, it must be done using the feature **Signal Station Warning**.

Remarks:

- The **Signal Station Warning** must only be used to describe the function of the signal station, independent of the building or structure itself. If it is required to encode the building or structure housing the service, it must be done using an appropriate feature (for example **Building, Landmark**).
- Each VHF-channel should be indicated, using the attribute **communication channel** (see clause 27.107). Alternately, if the same VHF-channel(s) apply to multiple features in the dataset, this should be indicated through an associated instance of the information type **Contact Details**, attribute **communication channel** (see clause 24.1).

Distinction: Signal Station Traffic.

Inland specific Encoding Instructions:

- A) EUR: Depth indicators and High Water Marks must be encoded.
- B) A remote display of a depth indicator has to be encoded in the same way. The name of the related depth indicator has to be encoded as **feature name** (OBJNAM). The value of waterway distance of the related depth indicator can be provided in **information text** (INFORM). The remote display has to be associated to the related **Signal Station Warning** (sistaw) with a **Depth And Clearance Indicator Association**.
- C) A remote display of a waterway gauge has to be encoded as signal station warning. The name of the related waterway gauge has to be encoded as **feature name** (OBJNAM). The value of waterway distance of the related **waterway gauge** can be provided in **information text**

(INFORM). The remote display has to be associated to the related **waterway gauge** with the **depth and clearance indicator association**.

- D) Signal Station Warning: possible current because of outlet of water
 - i) A signal station that warns in case of currents caused by outlets of water should be encoded as a **Signal Station Warning** (sistaw) with **category of signal station warning** 1 = warning.
 - ii) An indication of the cause and the form of the warning should be provided in **information** (INFORM).
 - iii) If e.g. 3 red lights are warning **information text** (INFORM) should be encoded with ""possible current because of outlet of water when red lights are on".
 - iv) For formatted text in an external file, **file reference** (TXTDSC) has to be used.
- E) For high water marks additional information, e.g. "l = 460 cm at gauge Kaub" should be encoded in **information text** (INFORM).

22.5 Traffic signal station

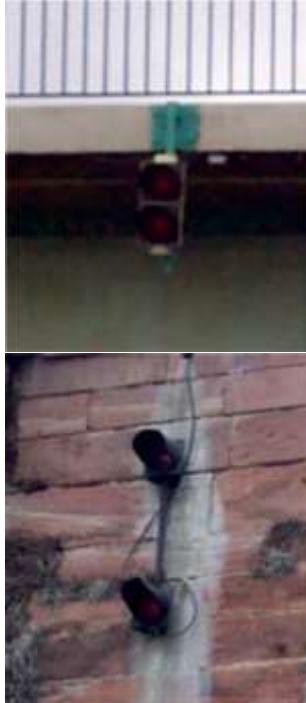
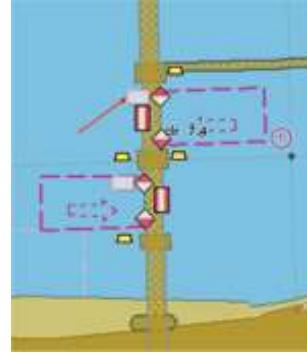
IHO Definition: **TRAFFIC SIGNAL STATION.** A traffic signal station is a place on shore from which signals are made to regulate the movement of traffic. (Adapted from IHO Dictionary – S-32 and S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.155, November 2000).

For IENCs this includes

- Bridge passage signal station: a place on shore from which signals are made for the control of vessels wishing to pass under a bridge.
- Lock signal station: a place on shore from which signals are made for the control of vessels entering or leaving a lock.
- Oncoming traffic indicator: a place on shore from which signals are made to inform about oncoming traffic.
- Port entry and departure: a place on shore from which signals are made for the control of vessels entering or leaving a port.

S-401 Geo Feature: Signal Station Traffic (sistat) (O)

Primitives: Point, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol
 <i>Bridge passage</i>		 <i>Bridge passage</i>
 <i>Lock</i>		 <i>Oncoming traffic indicator</i>

 <p><i>Lock</i></p>  <p><i>Oncoming traffic indicator</i></p>  <p><i>Port entry and departure</i></p>		 <p><i>Port entry and departure</i></p>					
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="padding: 2px;">S-401 Attribute</th> <th style="padding: 2px;">S-57 Acronym</th> <th style="padding: 2px;">Allowable Encoding Value</th> <th style="padding: 2px;">Type</th> <th style="padding: 2px;">Multiplicity</th> </tr> </thead> </table>			S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity			

category of signal station, traffic	(CATSIT)	1 : port control 2 : port entry and departure 3 : International Port Traffic 4 : berthing signal station 5 : dock 6 : lock 7 : flood barrage station 8 : bridge passage 9 : dredging 10 : traffic control light	EN	1,*
<i>communication channel</i>	(COMCHA)		TE	0,*
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
<i>fixed date range</i>		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
interoperability identifier		MRN (see clause 27.161)	URN	0,1
<i>periodic date range</i>		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 12 : illuminated 14 : public 15 : synchronized 16 : watched 17 : unwatched	EN	0,*
scale minimum	(SCAMIN)	[EUR: 22000, US: 60000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
Direction of Impact	(dirimp)	1 : Upstream 2 : Downstream 3 : To the Left Bank 4 : To the Right Bank	EN	0,*

Condition	(CONDTN)	1 : Under Construction 2 : Ruined 3 : Under Reclamation 5 : Planned Construction	EN	0, 1
UN Location Code	(unlocd)		TE	0, 1
Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 †
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Component	Bridge Aggregation (see clause 25.3)	Bridge	Association	0,*

The Component	Barrage Association (see clause 0)	Dam	Association	0,*
The Component	Exceptional Navigation Structure Aggregation (see clause 0)	Exceptional Navigation Structure	Association	0,*
The Component	Lock Aggregation (see clause 25.23)	Lock Basin	Association	0,*
The Component	Tunnel Aggregation (see clause 25.27)	Tunnel	Association	0,*
The Component	Signal Station Aggregation (see clause 25.27)	Bunker Station, Harbour Basin, Terminal	Aggregation	0,*
The Equipment	Structure/Equipment (see clause 25.12)	Cardinal Beacon, Cardinal Buoy, Bridge, Building, Crane, Conveyor, Daymark, Dolphin, Emergency Wreck Marking Buoy, Fishing Facility, Floating Dock, Fortified Structure, Hulk, Installation Buoy, Isolated Danger Beacon, Isolated Danger Buoy, Landmark, Lateral Beacon, Lateral Buoy, Mooring Buoy, Notice Mark, Offshore Platform, Pile, Pipeline Overhead, Pontoon, Pylon/Bridge Support, Safe Water Beacon, Safe Water Buoy, Shoreline Construction, Silo/Tank, Span Fixed, Span Opening, Special Purpose/General Beacon, Special Purpose/General Buoy, Structure Over Navigable Water, Wind Turbine, Wreck	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*
<p>[†] Complex attribute feature name, sub-attribute name usage is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.</p> <p>For each instance of fixed date range, at least one of the sub-attributes date end or date start must be populated.</p> <p>For each instance of information, at least one of the sub-attributes file reference or text must be populated.</p>				

22.5.1 Traffic signal stations

Signal stations communicating visually have declined in importance. They are encoded on the largest optimum display scale IENC data not only for their main role of signalling information and instructions but also as a form of landmark. The signals generally exhibit lights by day and night but may display shapes or flags by day.

The nature of traffic signals varies from country to country and even from port to port. For charting purposes traffic signals can be considered to include, for instance:

- Port entry and departure signals;
- Lock, docking and berthing signals;
- Bridge signals;
- International traffic signals.

If it is required to encode a traffic signal station, it must be done using the feature **Signal Station Traffic**.

Remarks:

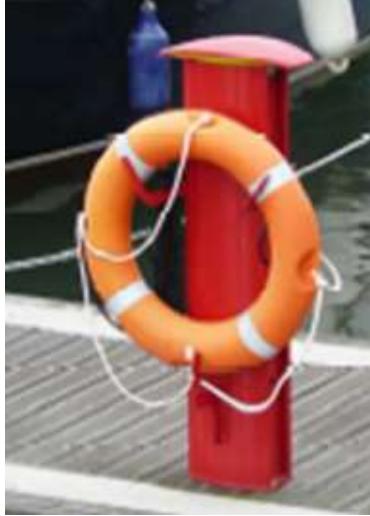
- If it is required to encode a bridge light marking the centre of a navigable span, it must be done using a light feature (see Section 19).
- The **Signal Station Traffic** must only be used to describe the function of the signal station, independent of the building or structure itself. If it is required to encode the building or structure housing the service, it must be done using an appropriate feature (for example **Building, Landmark**).
- Each VHF-channel should be indicated, using the attribute **communication channel** (see clause 27.107). Alternately, if the same VHF-channel(s) apply to multiple features in the dataset, this should be indicated through an associated instance of the information type **Contact Details**, attribute **communication channel** (see clause 24.1).

Distinction: Signal Station Warning.

Inland specific Encoding Instructions:

- A) **communication channel** (COMCHA) should not be used, communication area can be given in **Communication Area** (comare) feature.
- B) It's recommended to show the direction of the impact (attribute **direction of impact** (DIRIMP)) if the traffic signal station is only valid for one direction.
- C) If the traffic signal station has an official name it's has to be encoded with the attribute **feature name** (OBJNAM).
- D) The signals for opening bridges have to be included in a **Bridge Aggregation**.
- E) EUR: If the ISRS Location Code is available, it has to be encoded (see 2.4.13). If a maritime MRN or RIS-ID is available, the attribute **interoperability identifier** must be encoded (refer to **Fehler! Verweisquelle konnte nicht gefunden werden.**).

22.6 Rescue station

<p>IHO Definition: RESCUE STATION. A place where equipment for saving life at sea is maintained. (IHO Dictionary – S-32).</p> <p>S-401 Geo Feature: Rescue Station (RSCSTA) (O)</p> <p>Primitives: Point, Surface</p>				
<i>Real World</i> 	<i>Paper Chart Symbol</i>		<i>Inland ECDIS or ECS Symbol</i>	
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of rescue station	(CATRSC)	1 : rescue station with lifeboat 2 : rescue station with rocket 4 : refuge for shipwrecked mariners 5 : refuge for intertidal area walkers 6 : lifeboat lying at a mooring 7 : aid radio station 8 : first aid equipment 9 : lifebuoy, ring buoy, life ring, life saver	EN	1,*
communication channel	(COMCHA)		TE	0,*
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
interoperability identifier		MRN (see clause 27.161)	URN	0,1
periodic date range		See clause 2.4.8	C	0,*

date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 14 : public 16 : watched 17 : unwatched	EN	0,*
scale minimum	(SCAMIN)	[8000] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFOM)		(S) TE	0,1 †
Reported Date	(SORDAT)		TD	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services	(S) EN	0, 1

		13 : News Media 14 : Traffic Data		
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

22.6.1 Rescue station

The organisation of coast-watching and rescue services differs from country to country. For charting purposes it is assumed that these two distinct functions can be recognised individually, even though they may be parts of the same organisation co-ordinating and effecting life saving and performing other services.

Rescue stations are the places at which life saving equipment is held, especially lifeboats (usually in relatively sheltered positions, near sea level). Rescue stations are not necessarily visually prominent. The range of equipment used in rescue is wide, for example search and rescue helicopters; fast, long-distance lifeboats; inflatable inshore lifeboats.

If it is required to encode a rescue station, it must be done using the feature **Rescue Station**.

Remarks:

- The **Rescue Station** must only be used to describe the function of the rescue station, independent of the building or structure itself. If it is required to encode the building or structure housing the service, it must be done using an appropriate feature (for example **Building**, **Landmark**).
- If it is required to encode a refuge beacon, it must be done using a **Special Purpose/General Beacon** feature, with attribute **category of special purpose mark** = 44 (refuge beacon), not by using **Rescue Station**.
- Each VHF-channel should be indicated, using the attribute **communication channel** (see clause 27.107). Alternately, if the same VHF-channel(s) apply to multiple features in the dataset, this should be indicated through an associated instance of the information type **Contact Details**, attribute **communication channel** (see clause 24.1).

Distinction: Building; Coast Guard Station; Special Purpose/General Beacon.

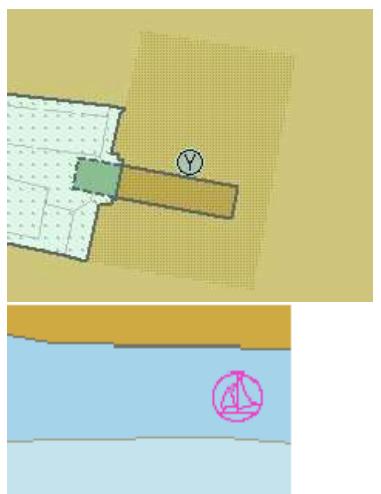
Inland specific Encoding Instructions:

22.7 Harbour facility

IHO Definition: **HARBOUR FACILITY.** A Harbour installation with a service or commercial operation of public interest. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.81, November 2000).

S-401 Geo Feature: Harbour Facility (HRBFAC, hrbfac) (O)

Primitives: Point, Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>
  <i>Marina (in the background)</i>		 <i>Marina</i>
S-401 Attribute	S-57 Acronym	Allowable Encoding Value
category of harbour facility	(CATHAF)	1 : RoRo-terminal 3 : ferry terminal 4 : fishing harbour 5 : yacht harbour/marina 6 : naval base 7 : tanker terminal 8 : passenger terminal 9 : shipyard 10 : container terminal 11 : bulk terminal 12 : ship lift 13 : straddle carrier 14 : service harbour 15 : pilotage service 16 : service and repair 17 : quarantine station
<i>communication channel</i>	(COMCHA)	TE
<i>condition</i>	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction
<i>feature name</i>		See clause 2.5.8
<i>language</i>		ISO 639-2/T
<i>name</i>	(OBJNAM) (NOBJNM)	(S) TE

<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 †
<i>fixed date range</i>		See clause 2.4.8	C	0,1
<i>date end</i>	(DATEND)		(S) TD	0,1 †
<i>date start</i>	(DATSTA)		(S) TD	0,1 †
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>nature of construction</i>	(NATCON)	1 : masonry 2 : concreted 3 : loose boulders 6 : wooden 7 : metal	EN	0,*
<i>periodic date range</i>		See clause 2.4.8	C	0,*
<i>date end</i>	(PEREND)		(S) TD	1,1
<i>date start</i>	(PERSTA)		(S) TD	1,1
<i>product</i>	(PRODCT)	1 : oil 2 : gas 3 : water 4 : stone 5 : coal 6 : ore 7 : chemicals 8 : drinking water 9 : milk 10 : bauxite 11 : coke 12 : iron ingots 13 : salt 14 : sand 15 : timber 16 : sawdust/wood chips 17 : scrap metal 18 : liquefied natural gas 19 : liquefied petroleum gas 20 : wine 21 : cement 22 : grain 25 : clay	EN	0,1
<i>reported date</i>	(SORDAT)	See clause 2.4.8	TD	0,1
<i>restriction</i>	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 15 : construction prohibited 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited	EN	0,*

		19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 23 : cargo transhipment (lightening) prohibited 24 : dragging prohibited 27 : speed restricted 28 : Overtaking Prohibited 29 : Overtaking of Convoys by Convoys Prohibited 30 : Passing or Overtaking Prohibited 31 : Berthing Prohibited 32 : Berthing Restricted 33 : Making Fast Prohibited 34 : Making Fast Restricted 35 : Turning Prohibited 36 : Restricted Fairway Depth 37 : Restricted Fairway Width 38 : Use of Spuds Prohibited 40 : SOx Emission Restricted 41 : NOx Emission Restricted 42 : power driven vessels prohibited 43 : Passing or Overtaking of Convoys by Convoys Prohibited		
<i>status</i>	(STATUS)	1 : permanent 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 9 : mandatory 12 : illuminated 13 : historic 14 : public 16 : watched 17 : unwatched	EN	0,*
<i>vessel speed limit</i>			C	0,*
speed limit			(S) RE	1,1
speed units		2 : kilometres per hour 3 : miles per hour 4 : knots	(S) EN	1,1
vessel class			(S) TE	0,1
scale minimum	(SCAMIN)	[EUR: 12000, US: 22000, but 60000 for marinas in US] or see clause 2.5.9	IN	1,1
<i>information</i>		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †

<i>pictorial representation</i>	(PICREP)	See clause 2.4.12.2	TE	0,1
UN Location Code	(unlocd)		TE	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
<i>language</i>		ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)		(S) TE	1,1
<i>name usage</i>		1 : default name display 2 : alternate name display	(S) EN	0,1 †
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

22.7.1 Harbour facilities

If it is required to encode a harbour facility, it must be done using the feature **Harbour Facility**.

Remarks:

- Fishing harbours or ports are equipped to provide for the particular needs of fishing boats. Boat harbours and marinas are areas of sheltered water, generally within harbours or ports, set aside for the use of small craft, usually with moorings, buoys, and, in the case of marinas, berthing facilities.
- Depending on the navigational purpose, harbour facilities are defined by: an area including docks, basins, infrastructure such as buildings and dockside equipment; or a point.
- If it is required to encode a terminal with facilities to load/unload or store shipping containers, this should be done using **Harbour Facility** with attribute **category of harbour facility** = 10 (container terminal).
- If it is required to encode a covered structure into which ships can go, this must be done using the feature **Structure Over Navigable Water** (see clause 8.7). These structures may be part of the larger harbour facility, which should be encoded as **Harbour Facility**.
- Each VHF-channel should be indicated using the attribute **communication channel** (see clause 27.107). Alternately, if the same VHF-channel(s) apply to multiple features in the dataset, this should be indicated through an associated instance of the information type **Contact Details**, attribute **communication channel** (see clause 24.1).
- For additional guidance regarding the encoding of vessel speed limits, see clause 17.4.

Distinction: Small Craft Facility; Structure Over Navigable Water.

Inland specific Encoding Instructions:

- A) Harbour facilities indicate only the services and not the physical buildings or other structures.
- B) Terminals are not encoded as **Harbour Facility** (HRBFAC, hrbfac) but as **Terminal** (termnl) (see 22.9).
- C) A shipyard on shore is always encoded as **Harbour Facility** (HRBFAC, hrbfac) with **category of harbour facility** (CATHAF) = 9. The single slipways are encoded as **Shoreline Construction** (SLCONS, slcons) (see 8.6). For docks see 8.17 and 8.18.
- D) If the harbour facility has a special time schedule or special operating hours apply, the feature can be combined with a time schedule. For this purpose please refer to the time schedule (general) feature **Time Schedule – In General** (tisdge) see 24.6. Alternatively or additionally the features Service Hours and Non Standard Working Days can be encoded and associated.
- E) If a structured external XML-file with more detailed communication information is available, the reference to the file must be entered in the **file reference** (TXTDSC) attribute.
- F) Harbour master's offices, pilot offices, water police offices and custom offices are encoded as **Building** (BUISGL).
- G) Only code **Harbour Facility** (HRBFAC, hrbfac) (S) feature when extents of a marina are known. Use **Harbour Facility** (HRBFAC, hrbfac) (P) when extents are not known.

22.8 Small craft facility

IHO Definition: **SMALL CRAFT FACILITY.** A place at which a service generally of interest to small craft or pleasure boats is available. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.162, November 2000).

S-401 Geo Feature: Small Craft Facility (SMCFAC) (O)

Primitives: Point, Surface

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of small craft facility	(CATSCF)	: visitors berth 2 : nautical club : boat hoist : sailmaker : boatyard : public inn : restaurant : chandler : provisions 10 : doctor 11 : pharmacy 12 : water tap 13 : fuel station 14 : electricity outlet : bottle gas : showers : launderette : public toilets : post box : public telephone : refuse bin : car park : parking for boats and trailers : caravan site : camping site : sewage pump-out station : emergency telephone : landing/launching place for boats : visitors mooring : scrubbing berth : picnic area : mechanics workshop 33 : guard and/or security service	EN	1,*
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1

name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		: default name display 2 : alternate name display	(S) EN	0,1 [†]
<i>interoperability identifier</i>		MRN (see clause 27.161)	URN	0,1
<i>periodic date range</i>		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
status	(STATUS)	: permanent 2 : occasional : recommended : not in use : periodic/intermittent : reserved : temporary : private : mandatory 12 : illuminated 14 : public : watched 17 : unwatched	EN	0,*
scale minimum	(SCAMIN)	[EUR: 8000, US: 12000] or see clause 2.5.9	IN	1,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 [†]
<i>pictorial representation</i>	(PICREP)	See clause 2.4.12.2	TE	0,1
Condition	(CONDTN)	: Under Construction 2 : Ruined : Under Reclamation 5 : Planned Construction	EN	0, 1
Reported Date	(SORDAT)		TD	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control : Police : Port : Immigration : Health : Coast Guard : Agricultural : Military 10 : Private Company 11 : Maritime Police	(S) EN	0, 1

		12 : Environmental 13 : Fishery 14 : Finance : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		: Law or Regulation 2 : Official Publication : Mariner Report, Confirmed : Mariner Report, Not Confirmed : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		: default name display 2 : alternate name display	(S) EN	0,1 [†]

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information, Non Standard Working Days, Service Hours, Time Schedule in General	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

22.8.1 Small craft facilities

If it is required to encode a small craft facility, it must be done using the feature **Small Craft Facility**.

Remarks:

- The **Small Craft Facility** must only be used to encode the function. In addition, if it is required to encode a physical feature (for example building), it must be done using an appropriate feature (for example **Building**).
- Due to possible Inland ECDIS or ECS display issues **Small Craft Facility** features of type surface should only be encoded on **Land Area**, **Shoreline Construction**, **Hulk** or **Pontoon** features of type surface.

Distinction: Building; Harbour Facility; Shoreline Construction; Structure Over Navigable Water.

Inland specific Encoding Instructions:

- A) If the small craft facility has a special time schedule or special operating hours apply, the feature can be combined with a time schedule. For this purpose please refer to the **Time Schedule – In General** feature (tisdge) see 24.6. Alternatively or additionally the features Service Hours and Non Standard Working Days can be encoded and associated.
- B) For bunker, fuel and water supply for commercial vessels see 22.11, for refuse dump see 22.12.
- C) If a structured external XML-file with more detailed communication information is available, the reference to the file has to be entered in the **file reference** (TXTDSC) attribute.

22.9 Terminal

<p>IHO Definition: A terminal covers that area on shore which provides buildings and constructions for the transfer of cargo or passengers from and to ships.</p> <p>S-401 Geo Feature: Terminal (termnl) (C)</p> <p>Super Type:</p> <p>Primitives: point, surface</p>				
<p><i>Real World</i></p>  <p><i>container</i></p>		<p><i>Paper Chart Symbol</i></p>		<p><i>Inland ECDIS or ECS Symbol</i></p> 
 <p><i>bulk</i></p>				
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of Harbour Facility	(CATHAF)	1 : RoRo Terminal 3 : Ferry Terminal 4 : Fishing Harbour 5 : Yacht Harbour/Marina 6 : Naval Base 7 : Tanker Terminal 8 : Passenger Terminal 9 : Shipyard 10 : Container Terminal 11 : Bulk Terminal 12 : Ship Lift 13 : Straddle Carrier 14 : Service Harbour 15 : Pilotage Service 16 : Service and Repair 17 : Quarantine Station 18 : official transhipment point for large-volume and heavy-goods	EN	1, *
Transshipping Goods	(trshgd)	1 : Containers 2 : Bulk Goods 3 : Oil 4 : Fuel 5 : Chemicals 6 : Liquid Goods	EN	0, *

		7 : Explosive Goods 8 : Fish 9 : Cars 10 : General Cargo 11 : large-volume and heavy-goods (exceptional transports)		
UN Location Code	(unlocd)		TE	0, 1
feature name		See clause 2.5.8	C	0, *
language		ISO 639-2/T	(S) TE	1, 1
name	(OBJNAM) (NOBJNM)		(S) TE	1, 1
name usage		1 : default name display 2 : alternate name display	(S) EN	0, 1 †
Scale Minimum	(SCAMIN)	[EUR: 12000, US: 18750] or see clause 2.5.9	IN	1, 1
<i>Fixed Date Range</i>			C	0, 1
Date End	(DATEND)		(S) TD	0, 1
Date Start	(DATSTA)		(S) TD	0, 1
<i>Periodic Date Range</i>			C	0, *
Date End	(DATEND)		(S) TD	1, 1
Date Start	(DATSTA)		(S) TD	1, 1
Reported Date	(SORDAT)		TD	0, 1
Status	(STATUS)	5 : Periodic/Intermittent 7 : Temporary 18 : Existence Doubtful	EN	0, 1
Condition	(CONDTN)	1 : Under Construction 2 : Ruined 5 : Planned Construction	EN	0, *
Information	(INFORM)		C	0, *
File Locator			(S) TE	0, 1
File Reference	(TXTDSC)		(S) TE	0, 1
Headline			(S) TE	0, 1
Language			(S) TE	1, 1
Text	(INFORM) (NINFOM)		(S) TE	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
interoperability identifier		MRN (see clause 27.161)	URN	0, 1
In Dispute			BO	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company	(S) EN	0, 1

		11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0, *
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Component	Anchorage Or Berth Aggregation (see clause 25.18)	Anchorage Area, Anchor Berth, Berth, Mooring Area	Association	0,*
The Collection	Signal Station Aggregation (see clause 25.27)	Signal Station Traffic, Signal Station Warning	Aggregation	0,*
The Updated Object	Updated Information (see clause 25.17)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Non-Standard Working Day, Service Hours, Nautical Information, Time Schedule In General	Association	0,*
-	Spatial Association (see clause 25.11)	Spatial Quality	Association	0,*

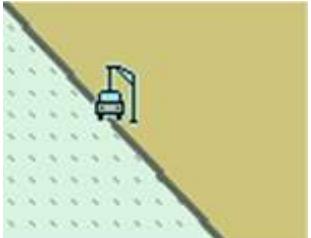
† Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

Inland specific encoding instructions:

- A) Terminals are not encoded as **Harbour Facility** (HRBFAC, hrbfac) but as **Terminal** (termnl).

- B) A terminal covers the landside area in which all the transshipping facilities and warehouses are located.
- C) If a structured external XML-file with more detailed communication information is available, the reference to the file has to be entered in the **file reference** (TXTDSC) attribute.
- D) If the terminal has a special time schedule or special operating hours apply, the object can be combined with a time schedule. For this purpose please refer to the **Time Schedule – In General** feature (tisdge) see 24.6. Alternatively or additionally the features Service Hours and Non Standard Working Days can be encoded and associated.
- E) EUR: If the ISRS Location Code is available it has to be encoded (refer to 2.4.13). If a maritime MRN or RIS-ID is available, the attribute **interoperability identifier** must be encoded (refer to **Fehler! Verweisquelle konnte nicht gefunden werden.**).
- F) EUR: Terminals must be encoded. If the borderline of the area is not known, the terminal has to be encoded at least as a point feature.
- G) EUR: Category of harbour facility 18 (official transhipment point for large-volume and heavy goods) and transhipping goods 11 (large-volume and heavy goods (exceptional transport)) should be encoded in accordance with the national definitions of such transports.
- H) EUR: If a large-volume and heavy goods transhipment point can only be used temporarily because it mainly serves other purposes, e.g. as a ferry ramp, the attribute (C) STATUS = 7 (temporary) must be set.

22.10 Vehicle Transfer

<p>IHO Definition: A place where vehicles can be loaded or unloaded from the inland vessel with onboard or on-shore facilities.</p> <p>S-401 Geo Feature: Vehicle Transfer (vehtrf) (O)</p> <p>Super Type:</p> <p>Primitives: point, surface</p>				
<i>Real World</i>	<i>Paper Chart Symbol</i>		<i>Inland ECDIS or ECS Symbol</i>	
				
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Height	(HEIGHT)	[xxx.x] metres, e.g., 27.4	RE	1, 1
UN Location Code	(unlocd)		TE	0, 1
Vertical Datum	(VERDAT) (Datum Level) (Reference Plane) (Levelling Datum) (Datum for Sounding Reduction) (Datum for Heights)	10 : Approximate Lowest Astronomical Tide 12 : Mean Lower Low Water 23 : Lowest Astronomical Tide 24 : Local Datum 31 : Local Low Water Reference Level 32 : Local High Water Reference Level 33 : Local Mean Water Reference Level 34 : Equivalent Height of Water (German GIW) 35 : Highest Shipping Height of Water (German HSW) 36 : Reference Low Water Level According to Danube Commission 37 : Highest Shipping Height of Water According to Danube Commission 38 : Dutch River Low Water Reference Level (OLR) 39 : Russian Project Water Level 40 : Russian Normal Backwater Level 41 : Ohio River Datum 43 : Dutch High Water Reference Level 45 : Dutch Estuary Low Water Reference Level (OLW)	EN	0, 1
Condition	(CONDTN)	1 : Under Construction 2 : Ruined	EN	0, 1

		5 : Planned Construction		
feature name		See clause 2.5.8	C	0, *
language		ISO 639-2/T	(S) TE	1, 1
name	(OBJNAM) (NOBJNM)		(S) TE	1, 1
name usage		1 : default name display 2 : alternate name display	(S) EN	0, 1 †
Scale Minimum	(SCAMIN)	[45000] or see clause 2.5.9	IN	1, 1
<i>Fixed Date Range</i>			C	0, 1
Date End	(DATEND)		(S) TD	0, 1
Date Start	(DATSTA)		(S) TD	0, 1
<i>Periodic Date Range</i>			C	0, *
Date End	(DATEND)		(S) TD	1, 1
Date Start	(DATSTA)		(S) TD	1, 1
Reported Date	(SORDAT)		TD	0, 1
Status	(STATUS)	5 : Periodic/Intermittent 18 : Existence Doubtful	EN	0, 1
<i>Information</i>	(INFORM)		C	0, *
File Locator			(S) TE	0, 1
File Reference	(TXTDSC)		(S) TE	0, 1
Headline			(S) TE	0, 1
Language			(S) TE	1, 1
Text	(INFORM) (NINFOM)		(S) TE	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Category of Vehicle Transfer	(catvtr)	1 : Official 2 : Private 3 : Suitable for Car Cranes 4 : Suitable for Car Planks 5 : Permission Required 6 : Locked Gate	EN	1, *
Name of Vertical River Datum Reference Level	(vcrlev)	(Name of reference level to which vertical clearances are referred (from verdat list) plus version indication), e.g., HSW 2002	TE	0, 1
Vertical River Datum Reference Level Value	(vcrval)	[xx.xx] (metres), e.g., 1.15	RE	0, 1
interoperability identifier		MRN (see clause 27.161)	URN	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military	(S) EN	0, 1

		10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0, *
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Component	Anchorage Or Berth Aggregation (see clause 25.18)	Anchorage Area, Anchor Berth, Berth, Mooring Area	Association	0,*
The Collection	Notice Mark Aggregation (see clause 0)	Notice Mark	Aggregation	0,*
The Updated Object	Updated Information (see clause 25.17)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Non-Standard Working Day, Service Hours, Nautical Information, Time Schedule in General	Association	0,*
-	Spatial Association (see clause 25.11)	Spatial Quality	Association	0,*

† Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

Inland specific encoding instructions:

- A) If a structured external XML-file with more detailed communication information is available, the reference to the file has to be entered in the **file reference** (TXTDSC) attribute.
- B) If the vehicle transport location has a special time schedule or special operating hours apply, the object can be combined with a time schedule. For this purpose please refer to the **Time Schedule – In General** feature (tisdge) (24.6) Alternatively or additionally the features Service Hours and Non Standard Working Days can be encoded and associated.
- C) EUR: If the ISRS Location Code is available it has to be encoded (refer 2.4.13). If a maritime MRN or RIS-ID is available, the attribute **interoperability identifier** must be encoded (refer to **Fehler! Verweisquelle konnte nicht gefunden werden.**).
- D) Use **name of vertical river datum reference level** (vcrlev) and **vertical river datum reference level value** (vcrval) if the local value and name of vertical river datum reference level (design waterlevel) is known.

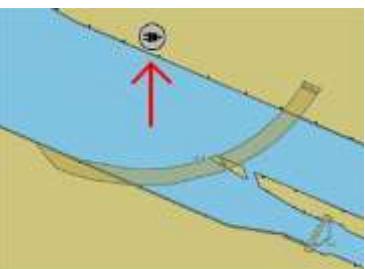
22.11 Bunker Station

IHO Definition: A station, at which a ship is able to bunker fuel, water or ballast or to obtain electrical power supply.

S-401 Geo Feature: Bunker Station (bunsta) (O)

Super Type:

Primitives: point

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol			
					
					
 power supply station					
S-401 Attribute					
S-57 Acronym		Allowable Encoding Value	Type	Multiplicity	
Bunker Vessel, Availability		(bunves)	1 : Bunker Vessel Available 2 : No Bunker Vessel Available	EN	1, 1
Category of Bunker Station		(catbun)	1 : Diesel Oil 2 : Water 3 : Ballast 4 : Power 5 : Compressed Hydrogen Bunkering 6 : Liquefied Hydrogen Bunkering	EN	0, *

		7 : Methanol Bunkering 8 : Ammonia Bunkering		
UN Location Code	(unlocd)		TE	0, 1
Condition	(CONDTN)	1 : Under Construction 2 : Ruined 5 : Planned Construction	EN	0, 1
feature name		See clause 2.5.8	C	0, *
language		ISO 639-2/T	(S) TE	1, 1
name	(OBJNAM) (NOBJNM)		(S) TE	1, 1
name usage		1 : default name display 2 : alternate name display	(S) EN	0, 1 †
Scale Minimum	(SCAMIN)	[22000] or see clause 2.5.9	IN	1, 1
<i>Fixed Date Range</i>			C	0, 1
Date End	(DATEND)		(S) TD	0, 1
Date Start	(DATSTA)		(S) TD	0, 1
<i>Periodic Date Range</i>			C	0, *
Date End	(DATEND)		(S) TD	1, 1
Date Start	(DATSTA)		(S) TD	1, 1
Reported Date	(SORDAT)		TD	0, 1
Power Characteristics			C	0, *
Category of Voltage	(catvol)	1 : 230V 2 : 400V	(S) EN	0, 1
Category of Frequency	(catfrq)	1 : 50Hz 2 : 60Hz	(S) EN	0, 1
Amount of Amperage	(amoamp)	[xxx] (amps), e.g. 300	(S) IN	0, 1
Category of Plug	(catplg)	[type of plug], e.g. CEE, Powerlock, etc.	(S) TE	0, 1
Number of Shore Connectors	(shrnum)	[xx] (number of connections), e.g. 4	(S) IN	0, 1
Allowed Consumption	(allcon)	e.g. 2 hours or 1000 kWh	(S) IN	0, 1
<i>Category of Temporal Variation</i>	(CATTEV)	4 : Likely to Change 5 : Unlikely to Change 6 : Unassessed	EN	0, 1
Status	(STATUS)	5 : Periodic/Intermittent 18 : Existence Doubtful	EN	0, *
Information	(INFORM)		C	0, *
File Locator			(S) TE	0, 1
File Reference	(TXTDSC)		(S) TE	0, 1
Headline			(S) TE	0, 1
Language			(S) TE	1, 1
Text	(INFORM) (NINFOM)		(S) TE	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
interoperability identifier		MRN (see clause 27.161)	URN	0, 1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1

<i>Category of Authority</i>	2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
..... <i>Country Name</i>		(S) TE	0, 1
<i>Source Type</i>	1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
..... <i>Source</i>	(SORIND)	(S) TE	1, *
<i>feature name</i>	See clause 2.5.8	(S) C	0,*
<i>language</i>	ISO 639-2/T	(S) TE	1,1
<i>name</i>	(OBJNAM) (NOBJNM)	(S) TE	1,1
<i>name usage</i>	1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Component	Anchorage Or Berth Aggregation (see clause 25.18)	Anchorage Area, Anchor Berth, Berth, Mooring Area	Association	0,*
The Collection	Signal Station Aggregation (see clause 25.27)	Signal Station Traffic, Signal Station Warning	Aggregation	0,*
The Updated Object	Updated Information (see clause 25.17)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Non-Standard Working Day, Service Hours, Nautical Information,	Association	0,*

		Time Schedule In General		
-	Spatial Association (see clause 25.11)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

Inland specific Encoding Instructions:

- A) Use **information** (INFORM) attribute just in case important information, which is not already encoded, has to be provided to boatmasters.
- B) The attribute **category of bunker vessel** (CATBUN) is of LIST type and hence more than one value may be chosen.
- C) If the station has a special time schedule or special operating hours apply, the feature can be combined with a time schedule. For this purpose please refer to the **Time Schedule – In General** feature (tisdge) (24.6) Alternatively or additionally the features Service Hours and Non Standard Working Days can be encoded and associated.
- D) If a structured external XML-file with more detailed communication information is available, the reference to the file has to be entered in the **file reference** (TXTDSC) attribute.
- E) The feature can be used as surface feature, for example when the station is on a pontoon. In that case the pontoon has only to be coded separately, if no depth data is available underneath.
- F) EUR: If the ISRS Location Code is available it has to be encoded (refer to 2.4.13). If a maritime MRN or RIS-ID is available, the attribute **interoperability identifier** must be encoded (refer to **Fehler! Verweisquelle konnte nicht gefunden werden.**).
- G) The attribute **information** (INFORM) can be used to describe additional types of fuel or to indicate that a fuel is provided in a swapable container.

22.12 Refuse Dump

IHO Definition: At a refuse dump ships are able to unload their refuse like waste oil or black water.				
S-401 Geo Feature: Refuse Dump (refdmp) (O)				
Super Type:				
Primitives: point				
<i>Real World</i>	<i>Paper Chart Symbol</i>		<i>Inland ECDIS or ECS Symbol</i>	
				
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of Refuse Dump	(catrfd)	1 : Cargo Residue/Slop 2 : Waste Oil 3 : Grey/Black Water 4 : Domestic Refuse	EN	0, *
UN Location Code	(unlocd)		TE	0, 1
Condition	(CONDTN)	1 : Under Construction 2 : Ruined 3 : Under Reclamation 5 : Planned Construction	EN	0, 1
feature name		See clause 2.5.8	C	0, *
language		ISO 639-2/T	(S) TE	1, 1
name	(OBJNAM) (NOBJNM)		(S) TE	1, 1
name usage		1 : default name display 2 : alternate name display	(S) EN	0, 1 †
Scale Minimum	(SCAMIN)	[22000] or see clause 2.5.9	IN	1, 1
<i>Fixed Date Range</i>			C	0, 1
Date End	(DATEND)		(S) TD	0, 1
Date Start	(DATSTA)		(S) TD	0, 1
<i>Periodic Date Range</i>			C	0, *
Date End	(DATEND)		(S) TD	1, 1
Date Start	(DATSTA)		(S) TD	1, 1
Reported Date	(SORDAT)		TD	0, 1
Status	(STATUS)	5 : Periodic/Intermittent	EN	0, 1
Information	(INFORM)		C	0, *
File Locator			(S) TE	0, 1
File Reference	(TXTDSC)		(S) TE	0, 1

Headline			(S) TE	0, 1
Language			(S) TE	1, 1
Text	(INFORM) (NINFOM)		(S) TE	0, 1
Pictorial Representation	(PICREP)		TE	0, 1
interoperability identifier		MRN (see clause 27.161)	URN	0, 1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0, *
language		ISO 639-2/T	(S) TE	1, 1
name	(OBJNAM) (NOBJNM)		(S) TE	1, 1
name usage		1 : default name display 2 : alternate name display	(S) EN	0, 1 †
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Component	Anchorage Or Berth Aggregation (see clause 25.18)	Anchorage Area, Anchor Berth, Berth, Mooring Area	Association	0, *
The Updated Object	Updated Information (see clause 25.17)	Update Information	Association	0, *

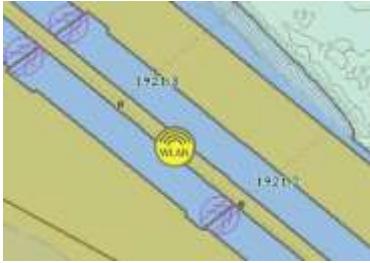
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Non-Standard Working Day, Service Hours, Nautical Information, Time Schedule In General	Association	0,*
-	Spatial Association (see clause 25.11)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

Inland specific encoding instructions:

- A) Use **information** (INFORM) attribute just in case important information, which is not already encoded, has to be provided to boatmasters.
- B) The attribute **category of refuse dump** (refdmp) is of LIST type and hence more than one value may be chosen.
- C) If the refuse dump has a special time schedule or special operating hours apply, the feature can be combined with a time schedule. For this purpose please refer to the **Time Schedule – In General** feature (tisdge) (24.6). Alternatively or additionally the features Service Hours and Non Standard Working Days can be encoded and associated.
- D) If a structured external XML-file with more detailed communication information is available, the reference to the file has to be entered in the **file reference** (TXTDSC) attribute.
- E) EUR: If the ISRS Location Code is available it has to be encoded (refer to 2.4.13). If a maritime MRN or RIS-ID is available, the attribute **interoperability identifier** must be encoded (refer to Fehler! Verweisquelle konnte nicht gefunden werden.).

22.13 Communication Area

<p>IHO Definition: Indicates the coverage of an area, in which a vessel has to report or may request information.</p> <p>S-401 Geo Feature: Communication Area (comare) (C)</p> <p>Super Type:</p> <p>Primitives: surface</p>				
<i>Real World</i>	<i>Paper Chart Symbol</i>		<i>ECDIS Symbol</i>	
				
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of Communication	(catcom)	1 : VTS Centre 2 : VTS Sector 3 : IVS Point 4 : MIB 5 : Lock 6 : Bridge 7 : Custom 8 : Harbour 9 : WLAN Area	EN	0, *
Communication Channel	(COMCHA)	[[XXXX]:[XXXX];...]	TE	1, *
Status	(STATUS)	2 : Occasional 3 : Recommended 4 : Not in Use 5 : Periodic/Intermittent 8 : Private 9 : Mandatory 12 : Illuminated 14 : Public 16 : Watched 17 : Unwatched	EN	0, *
feature name		See clause 2.5.8	C	0, *
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
Scale Minimum	(SCAMIN)	[EUR: 45000, US: 60000] or see clause 2.5.9	IN	1, 1
<i>Fixed Date Range</i>			C	0, 1
Date End	(DATEND)		(S) TD	0, 1
Date Start	(DATSTA)		(S) TD	0, 1
<i>Periodic Date Range</i>			C	0, *
Date End	(DATEND)		(S) TD	1, 1

Date Start	(DATSTA)		(S) TD	1, 1
Reported Date	(SORDAT)		TD	0, 1
Information	(INFORM)		C	0, *
File Locator			(S) TE	0, 1
File Reference	(TXTDSC)		(S) TE	0, 1
Headline			(S) TE	0, 1
Language			(S) TE	1, 1
Text	(INFORM) (NINFOM)		(S) TE	0, 1
Pictorial Representation	(PICREP)		TE	0, 1
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0, *
language		ISO 639-2/T	(S) TE	1, 1
name	(OBJNAM) (NOBJNM)		(S) TE	1, 1
name usage		1 : default name display 2 : alternate name display	(S) EN	0, 1 †
Feature Associations				

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Component	Lock Aggregation (see clause 25.23)	Lock Basin	Association	0,*
The Component	Bridge Aggregation (see clause 25.3)	Bridge	Association	0,*
The Component	Anchorage Or Berth Aggregation (see clause 25.18)	Anchorage Area, Anchor Berth, Berth, Mooring Area	Association	0,*
The Collection	Notice Mark Aggregation (see clause 0)	Notice Mark	Aggregation	0,*
The Component	Barrage Association (see clause 0)	Dam	Association	0,*
The Component	Exceptional Navigation Structure Aggregation (see clause 0)	Exceptional Navigation Structure	Association	0,*
The Component	Tunnel Aggregation (see clause 25.27)	Tunnel	Association	0,*
The Updated Object	Updated Information (see clause 25.17)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Non-Standard Working Day, Service Hours, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.11)	Spatial Quality	Association	0,*

[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

Inland specific Encoding Instructions:

- EUR: A communication area can be defined by notice marks (signs B.11 or E.23, see 20.17) or by regulations. Communication areas at locks should include the waiting areas and advance signals. The communication area at bridges should cover about 1 to 1,5 km on both sides of the bridge, depending on the normal radar range.
- Use **Communication Area** (comare) feature.
- If there is a reporting duty at a specific point/line use **Radio Calling-In Point** (rdocal) feature. (Refer to 15.18)
- The purpose of communication area should be given in the **category of communication** (CATCOM) attribute.
- The channel number assigned to a specific radio frequency, frequencies or frequency band has to be indicated in the **communication channel** (COMCHA) attribute.
- EUR: The **status** (STATUS) attribute should be used to indicate whether communication is recommended (sign E.23) or mandatory (sign B.11).
- Detailed communication information (postal address, phone, fax, e-mail etc.) should also be encoded in the respective feature.
- A communication area for customs (BUISGL, chkpnt) or harbours (hrbare, prtare, hrbsn) should indicate in the feature name for which custom, port or harbour it is.

- I) If a structured external XML-file with more detailed communication information is available, the reference to the file has to be entered in **file reference** (TXTDSC). If some other means of communication is used for time-critical navigation-related communication, this should be mentioned in the remarks of the XML-file.
- J) EUR: **Communication Areas** must be encoded.
- K) For areas where Wireless Networks are available free of charge **category of communication** (CATCOM) 9 = WLAN area should be used. **Communication channel** (COMCHA) shall be coded as "unknown". The network name (SSID = Service Set Identifier) shall be coded within **feature name** (OBJNAM), whereas **information** (INFORM) can be used to provide additional information as intended coverage, encryption, available services, etc.

22.14 Sensor

<p>IHO Definition: A device that responds to a physical stimulus (as heat, light, sound, pressure, magnetism or a particular motion) and transmits a resulting impulse (as for measurement or operating a control).</p>				
<p>S-401 Geo Feature: Sensor (sensor) (O)</p>				
<p>Super Type:</p>				
<p>Primitives: point</p>				
Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol	Type	Multiplicity
				
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of Sensor	(catsen)	1 : Light Activated 2 : Telephone Activated 3 : Radio Activated	EN	1, *
Function of Sensor	(fnctsn)	1 : Reduce Bridge Lighting	EN	1, *
Scale Minimum	(SCAMIN)	[22000] or see clause 2.5.9	IN	1, 1
<i>Fixed Date Range</i>			C	0, 1
Date End	(DATEND)		(S) TD	0, 1
Date Start	(DATSTA)		(S) TD	0, 1
<i>Periodic Date Range</i>			C	0, *
Date End	(DATEND)		(S) TD	1, 1
Date Start	(DATSTA)		(S) TD	1, 1
Reported Date	(SORDAT)		TD	0, 1
Status	(STATUS)	5 : Periodic/Intermittent	EN	0, 1
<i>Information</i>	(INFORM)		C	0, *
File Locator			(S) TE	0, 1
File Reference	(TXTDSC)		(S) TE	0, 1
Headline			(S) TE	0, 1
Language			(S) TE	1, 1
Text	(INFORM) (NINFOM)		(S) TE	0, 1
Communication channel	(COMCHA)			0, °
Pictorial Representation	(PICREP)		TE	0, 1

Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Equipment	Structure/Equipment (see clause 25.12)	Bridge, Span Opening, Span Fixed, Structure Over Navigable Water, Exceptional Navigation Structure	Association	0,*
The Updated Object	Updated Information (see clause 25.17)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
=	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*

-	Spatial Association (see clause 25.11)	Spatial Quality	Association	0,*
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[†] Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

Inland specific encoding instructions:

- A) For a sensor used to reduce or to turn off bridge lighting, choose appropriate **category of sensor** (catsen) and **function of sensor** (fnctsn) = 1 (reduce bridge lighting).
- B) If **category of sensor** (catsen) = 3 (radio activated), **communication channel** (COMCHA) must be used. The attribute **communication channel** encodes the various VHF-channels used for communication. Each VHF-channel should be indicated by 2 digits and up to 2 characters (A-Z), e.g. VHF-channel 7 --> 07', VHF-channel 16 --> 16'. The indication of several VHF-channels is possible.
- C) Details associated with **category of sensor** (catsen), e.g., "The decorative lights can be extinguished for 15-minutes by setting your VHF-FM radio to Channel 28 and rapidly clicking the mic 3 times", shall be encoded in the **information** (INFORM) field.

22.15 Waterway Gauge

<u>IHO Definition:</u> An instrument for measuring water levels.				
S-401 Geo Feature: Waterway Gauge (wtwgag) (C)				
Super Type:				
Primitives: point, surface				
Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
				
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Distance of Impact, Downstream	(disipd)		IN	0, 1
Distance of Impact, Upstream	(disipu)		IN	0, 1
Elevation	(ELEVAT)	[xxx.xx] (metres), e.g., 159.87	RE	0, 1
Name of Sounding Datum Reference Level	(sdrllev)		TE	0, 1
UN Location Code	(unlocd)		TE	0, 1
Vertical Datum	(VERDAT) (Datum Level) (Reference Plane) (Levelling Datum) (Datum for Sounding Reduction) (Datum for Heights)	10 : Approximate Lowest Astronomical Tide 12 : Mean Lower Low Water 23 : Lowest Astronomical Tide 24 : Local Datum 31 : Local Low Water Reference Level 32 : Local High Water Reference Level 33 : Local Mean Water Reference Level 34 : Equivalent Height of Water (German GIW) 35 : Highest Shipping Height of Water (German HSW) 36 : Reference Low Water Level According to Danube Commission 37 : Highest Shipping Height of Water According to Danube Commission 38 : Dutch River Low Water Reference Level (OLR) 39 : Russian Project Water Level 40 : Russian Normal Backwater Level 41 : Ohio River Datum 43 : Dutch High Water Reference Level 45 : Dutch Estuary Low Water Reference Level (OLW)	EN	0, 1
Condition	(CONDTN)	1 : Under Construction 2 : Ruined 5 : Planned Construction	EN	0, 1

feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †
Scale Minimum	(SCAMIN)	[EUR: 22000, US: 45000] or see clause 2.5.9	IN	1, 1
<i>Fixed Date Range</i>			C	0, 1
Date End	(DATEND)		(S) TD	0, 1
Date Start	(DATSTA)		(S) TD	0, 1
<i>Periodic Date Range</i>			C	0, *
Date End	(DATEND)		(S) TD	1, 1
Date Start	(DATSTA)		(S) TD	1, 1
Reported Date	(SORDAT)		TD	0, 1
Status	(STATUS)	5 : Periodic/Intermittent 18 : Existence Doubtful	EN	0, 1
Sounding Datum Reference Level Value	(sd rval)	[xx.xx] (metres), e.g., 2.05	RE	0, 1
<i>Information</i>	(INFORM)		C	0, *
File Locator			(S) TE	0, 1
File Reference	(TXTDSC)		(S) TE	0, 1
Headline			(S) TE	0, 1
Language			(S) TE	1, 1
Text	(INFORM) (NINFORM)		(S) TE	0, 1
<i>Pictorial Representation</i>	(PICREP)		TE	0, 1
Category of Waterway Gauge	(catgag)	1 : Water Level Staff / Pole 2 : Recording Water Level Gauge 3 : Recording Water Level Gauge With Remote Access 4 : Recording Water Level Gauge With External Indicator 5 : Recording Water Level Gauge With Remote Access and Remote Indicator	EN	0, 1
Value at Relevant High Water Level	(higwat)	xxx.xxx] (metres), e.g., 4.78	RE	0, 1
Name of Relevant High Water Level	(hignam)		TE	0, 1
Value at Relevant Low Water Level	(lowwat)	xxx.xxx] (metres), e.g., 4.78	RE	0, 1
Name of Relevant Low Water Level	(lownam)		TE	0, 1
Value at Relevant Mean Water Level	(meawat)	xxx.xxx] (metres), e.g., 4.78	RE	0, 1
Name of Relevant Mean Water Level	(meanam)		TE	0, 1
Value at Other Locally Relevant Water Level	(othwat)	xxx.xxx] (metres), e.g., 4.78	RE	0, 1
Name of Other Locally Relevant Water Level	(othnam)		TE	0, 1

Reference Gravitational Level	(reflev)	1 : Baltic Datum 2 : Adriatic Level 3 : Amsterdam Ordnance Datum (NAP) 4 : Mean Sea Level 5 : Other Datum 6 : National Geodetic Vertical Datum - NGVD29 7 : North American Vertical Datum - NAVD88 8 : Mean Sea Level 1912 9 : Mean Sea Level 1929 10 : Tweede Algemene Waterpassing	EN	0, 1
Name of Vertical River Datum Reference Level	(vcrlev)		TE	0, 1
Vertical River Datum Reference Level Value	(vcrval)	[xx.xx] (metres), e.g., 1.15	RE	0, 1
interoperability identifier		MRN (see clause 27.161)	URN	0, 1
Waterway Distance	(wtwdis)	[xxxx.xxx] (units defined in distance unit of measurement), e.g., 2451.732	RE	0, 1
distance unit of measurement	(hunits)	1 : metres 2 : yards 3 : kilometres 4 : statute miles 5 : nautical miles 7 : hectometres	EN	0,1
Source Indication			C	0, 1
<i>Reported Date</i>			(S) TD	0, 1
<i>Category of Authority</i>		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health 7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs	(S) EN	0, 1
<i>.....Country Name</i>			(S) TE	0, 1
<i>Source Type</i>		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services	(S) EN	0, 1

		13 : News Media 14 : Traffic Data		
.....Source	(SORIND)		(S) TE	1, *
<i>feature name</i>		See clause 2.5.8	(S) C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Component	Bridge Aggregation (see clause 25.3)	Bridge	Association	0,*
The Component	Lock Aggregation (see clause 25.23)	Lock Basin	Association	0,*
The Collection	Depth And Clearance Indicator Association (see clause 25.21)	Signal Station Warning	Aggregation	0,*
The Component	Barrage Association (see clause 0)	Dam	Association	0,*
The Component	Exceptional Navigation Structure Aggregation (see clause 0)	Exceptional Navigation Structure	Association	0,*
The Component	Overhead Cable Aggregation (see clause 0)	Cable Overhead	Association	0,*
The Component	Overhead Pipeline Aggregation (see clause 0)	Pipeline Overhead	Association	0,*
The Component	Tunnel Aggregation (see clause 25.27)	Tunnel	Association	0,*
The Updated Object	Updated Information (see clause 25.17)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.11)	Spatial Quality	Association	0,*

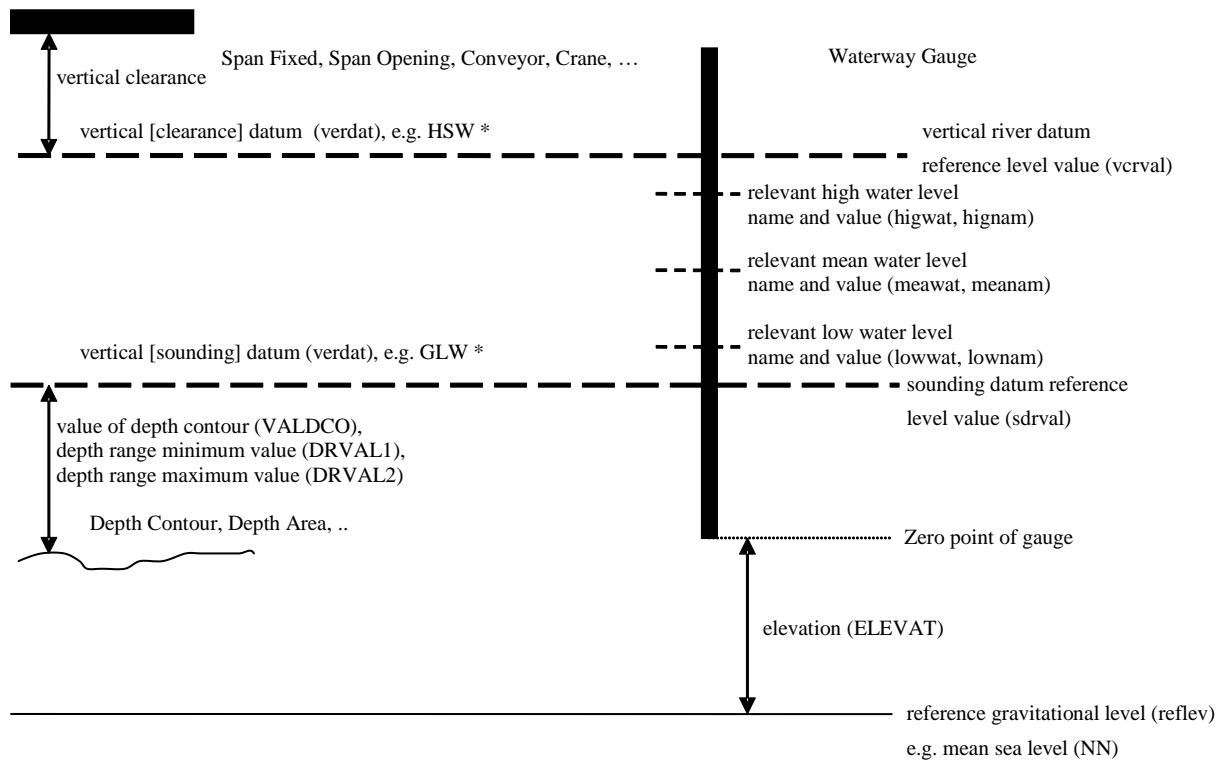
† Complex attribute **feature name**, sub-attribute **name usage** is mandatory if the name is intended to be displayed when display of names is enabled by the boatmaster. See clause 2.5.8.

Inland specific encoding instructions:

- A) The waterway gauge may be encoded as a point feature at the location of the real world entity.
Preferably the gauge should be encoded as a surface feature covering its complete area of applicability (to be decided by the chart producer if this area covers only the fairway or the complete riverbed).
- B) The name of the gauge shall be encoded by **feature name** (OBJNAM). As the name the term known by the boatmasters shall be chosen. In case an additional name in e.g., Cyrillic letters is well known this name may be encoded in accordance with 2.5.8.

- C) EUR: If the ISRS Location Code is available it has to be encoded (refer to 2.4.13). If a maritime MRN or RIS-ID is available, the attribute **interoperability identifier** must be encoded (refer to **Fehler! Verweisquelle konnte nicht gefunden werden.**).
- D) Category of the gauge may be encoded by using the **category of waterway gauge** (catgag) attribute.
- E) The river km or mile of the location of the gauge shall be encoded by using the **waterway distance** (wtwdis) attribute.
- F) The zero point of the gauge is defined by the attributes **elevation** (ELEVAT) (indicating the units above the locally used gravitational level) and **reference gravitational level** (reflev), indicating the used gravitational level itself (also refer to the picture below).
- G) When a gauge is encoded as a point feature (mainly in case a water level model is available), the area of applicability may be provided by a specific distance of impact, down and up stream using the attributes **distance of impact, downstream** (disipd) and **distance of impact, upstream** (disipu) . **Distance of impact, downstream** (disipd) and **distance of impact, upstream** (disipu) should be used for both point and surface features.
- H) Reference to specific defined water levels shall be enabled.
 - 1. For high water levels:
 - **value at relevant high water level** (higwat) to indicate the defined high water level (e.g. 567 cm)
 - **name of relevant high water level** (hignam) to indicate the specific high water level including the year of publication or a period indication (e.g., HSW96)
 - 2. For mean water levels:
 - **value at relevant mean water level** (meawat) to indicate the mean water level (value and units)
 - **name of relevant mean water level** (meanam) to indicate the specific mean water level including the year of publication or a period indication (name and year)
 - 3. For low water levels:
 - **value at relevant low water level** (lowwat) to indicate the low water level (value and units)
 - **name of relevant low water level** (lownam) to indicate the specific low water level including the year of publication or a period indication (name and year)
- I) In the event that there is another specific and important water level, this may be encoded by using the attributes **value at other locally relevant water level** (othwat) and **name of other locally relevant water level** (othnam).
- J) In order to enable IENC based applications to calculate clearances and depths automatically the following information is used: Vertical clearances at bridges shall always be referred to a specific water level. This level shall be indicated within the **name of vertical river datum reference** (vcrlev) attribute (preferably according to the list of **vertical datum** (VERDAT) values. This water level should be the same as indicated in **name of relevant high water level** (hignam).
- K) The same way as in the last point shall be followed for providing information on the reference water level for depth information. In this case the attribute **name of sounding datum reference level** (sdrlev) may be used and should be equal to **name of reference low water level** (lownam) in most cases.
- L) EUR: Waterway gauges that are relevant and useable for navigation must be encoded.
- M) A remote display of gauge has to be encoded as a Warning Signal Station (see clause x). The waterway gauge has to be included in the **Depth And Clearance Indicator Association**.

- N) Use **name of vertical river datum reference** (vcrlev) and **vertical river datum reference level value** (vcrval) if the local value and name of vertical river datum reference level (design waterlevel) is known.
- O) Use **name of sounding datum reference level** (sdrlev) and **sounding datum reference level value** (sdrvval) if the local value and name of vertical river datum reference level (design waterlevel) is known.



* The sounding or vertical datum (reference level) are defined either in
 - in the cell header (valid for all features in the cell)
 - at the meta features m_sdat or m_vdat, if another value than in cell header
 - at the feature itself (attribute verdat), if another value than in cell header or meta feature

23 Cartographic Features

23.1 Text placement

IHO Definition: **TEXT PLACEMENT**. The Text Placement feature is used in association with the Feature Name attribute or a light description to optimize text positioning in Inland ECDIS and ECS.

S-401 Cartographic Feature: Text Placement (O)

Primitives: Point

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>
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S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
text offset bearing			IN	1,1
text offset distance			IN	1,1
text rotation			BO	0,1
text type		1 : name 2 : feature characteristic	EN	1,2
scale minimum	(SCAMIN)	See clause 2.5.9	IN	1,1

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Cartographic Text	Text Association (see clause 25.13).	See next row	Association	0,2

Associated to: Administration Area, Airport/Airfield, Anchor Berth, Anchorage Area, Berth, Bollard, Bridge, Building, Built-Up Area, Bunker Station, Cable Area, Cable Overhead, Cable Submarine, Canal, Cardinal Buoy, Cardinal Beacon, Cargo Transhipment Area, Causeway, Checkpoint, Coast Guard Station, Coastline, Collision Regulations Limit, Communication Area, Conveyor, Crane, Current – Non-Gravitational, Dam, Daymark, Distance Mark, Dock Area, Dolphin, Dredged Area, Dry Dock, Dumping Ground, Dyke, Emergency Wreck Marking Buoy, Exceptional Navigational Structure, Fairway, Fairway System, Fence/Wall, Ferry Route, Fishing Facility, Floating Dock, Fog Signal, Fortified Structure, Foul Ground, Gate, Gridiron, Harbour Area (Administrative), Harbour Basin, Harbour Facility, Helipad, Hulk, Information Area, Installation Buoy, Isolated Danger Beacon, Isolated Danger Buoy, Lake, Land Area, Land Elevation, Land Region, Landmark, Lateral Beacon, Lateral Buoy, Light Air Obstruction, Light All Around, Light Sectored, Lock Basin, Lock Basin Part, Marine Farm/Culture, Maximum Permitted Ship Dimensions, Maximum Permitted Vessel Speed, Military Practice Area, Mooring Area, Mooring Buoy, Mooring Trot, Notice Mark, Obstruction, Offshore Platform, Offshore Production Area, Oil Barrier, Physical AIS Aid to Navigation, Pile, Pilot Boarding Place, Pilotage District, Pipeline Overhead, Pipeline Submarine/On Land, Pontoon, Port Area, Precautionary Area, Production/Storage Area, Pylon/Bridge Support, Radar Line, Radar Range, Radar Station, Radar Transponder Beacon, Radio Calling-In Point, Radio Station, Railway, Recommended Route Centreline, Recommended Track, Refuse Dump, Rescue Station, Restricted Area, River, Road, Runway, Safe Water Beacon, Safe Water Buoy, Sea Area/Named Water Area, Seabed Area, Seagrass, Seaplane Landing Area, Sensor, Shoreline Construction, Signal Station Traffic, Signal Station Warning, Silo/Tank, Slope Topline, Sloping Ground, Small Craft Facility, Sounding, Span Fixed, Span Opening, Special Purpose/General Beacon, Special Purpose/General Buoy, Structure Over Navigable Water, Submarine Pipeline Area, Terminal, Tidal Stream Panel Data, Tidal Stream – Flood/Ebb, Tideway, Time Schedule In General, Traffic Separation Scheme, Tunnel, Turning Basin, Two-Way Route, Underwater/Awash Rock, Vegetation, Vehicle Transfer, Vessel Traffic Service Area, Water Turbulence, Waterway Area, Waterway Axis, Waterway Gauge, Waterway Profile, Weed/Kelp, Wind Turbine, Wreck

23.1.1 Text placement

If it is required to place text on an IENC to improve clarity and readability of display, it must be done using the cartographic feature **Text Placement**. In navigationally relevant areas such as shipping channels and dredged areas, where default Inland ECDIS or ECS text positioning may cover other features, Data Producers should consider using **Text Placement**. The **Text Placement** feature must be associated with the relevant geo feature using the composition **Text Association** (see clause 25.13).

NOTE: Where an associated instance of **Text Placement** has not been related to a feature having the attribute **name** and/or the attributes associated with the characteristics of a light populated, the text will be positioned in the Inland ECDIS or ECS display in accordance with the default position for text strings defined in the Portrayal Catalogue.

Remarks:

- The **Text Placement** cartographic feature is used by the Inland ECDIS or ECS to optionally position text in Inland ECDIS or ECS, which has been populated using an attribute(s) for the associated feature. The attribute(s) is identified by populating the mandatory attribute **text type**.
- Where two instances of **text type** are populated for a **Text Placement** instance, the feature name and characteristics as derived from the target feature attribution will be vertically aligned in the Inland ECDIS or ECS display in accordance with the defined text offset bearing and distance. If it is required to position the feature name and the feature characteristics independently, this must be done by associating two instances of **Text Placement**, one having **text type** = 1 (name) and the other having **text type** = 2 (feature characteristic), to the target feature. Note, however, that independent vertical or horizontal alignment of both the name and the characteristic of a feature is not recommended, as the text will overlap as the boatmaster zooms to smaller scales than the optimum display scale for the data.
- The attributes **text offset bearing** and **text offset distance** define the bearing (related to true north) and distance of the anchor point of the text, in millimetres in the Inland ECDIS or ECS display, to be displayed from the associated feature. The values populated for these attributes must be determined based on the desired position of the text at the optimum display scale of the IENC data. Note that the attribute **text offset bearing** does not rotate the text itself, but determines the alignment of the anchor point (or justification) for the text location (horizontal (left, centred or right) and vertical (bottom, centre or top)) based on the encoded bearing. Displayed text will always appear horizontal regardless of the display mode set by the boatmaster (north-up or course-up), unless the Boolean attribute **text rotation** is set to *True*.
- The Boolean attribute **text rotation**, when populated as *True*, will rotate the text on the Inland ECDIS or ECS display to align along the bearing populated for the attribute **text offset bearing**.
- Data Producers are advised to determine the best positioning for text at the optimum display scale for the data; and based on “north-up” Inland ECDIS or ECS display. While **text offset bearing**, **text offset distance** and **text rotation** will position the text at the same location relative to the associated feature at all boatmaster’s Selected Viewing Scales, Data Producers are advised that, as the boatmaster zooms out to smaller viewing scales, text may unintentionally cover other charted detail. Therefore, as an alternative, Data Producers may experiment with positioning the text so that it clears the majority of other charted features at the smallest scale at which the text is intended to be displayed, and populating the attribute **scale minimum** accordingly (see bullet below). Data Producers are also advised that optimum results may not be achieved when the boatmaster has set the display setting for the Inland ECDIS or ECS to screen rotations other than “north-up”. Encoders should also consider the positioning of the name of a feature where the name is encoded in multiple languages, as the name displayed may be of varying character length based on the boatmaster’s language settings (see clause 2.5.8).
- The attribute **scale minimum** may be used to determine a scale at which the text string is no longer visible in the Inland ECDIS or ECS when scale minimum functionality is enabled. Where populated, the value for **scale minimum** on **Text Placement** must not be set to a smaller scale value than the value populated for the associated feature.

- S-401 portrayal for **Text Placement** has been developed to take into account the name of a light support structure feature where included in the association **Structure/Equipment** as follows:
 - Where **Text Placement** containing attribute **text type** = 1 (name) is associated to the equipment feature and the name has been encoded only on the structure feature, the **Text Placement** inherits the name from the structure.
 - Where **Text Placement** containing attribute **text type** = 1 (name) is associated to the equipment feature and the name has been encoded on the equipment feature, the **Text Placement** takes the name from the equipment feature. If a name has also been included on the structure feature, this will not be considered in this case, however a separate **Text Placement** associated to the structure may be encoded to place the name of the structure feature at a desired position, if required.
 - Where **Text Placement** containing attribute **text type** = 2 (feature characteristic) is associated to the equipment feature, the characteristics of the structure feature will not be considered.
- **Text Placement** should normally be associated with features of type point, but may be used for features of type curve and surface.

Distinction:

Inland specific Encoding Instructions:

24 Information types

24.1 Contact details

IHO Definition: CONTACT DETAILS. Information on how to reach a person or organisation by postal, internet, telephone, telex and radio systems.				
S-401 Information Type: Contact Details (C)				
Primitives: No Geometry				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
call sign	(CALSGN)		TE	0,1
communication channel	(COMCHA)		TE	0,*
contact instructions	(INFORM)		TE	0,1
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
frequency pair			C	0,*
frequency shore station receives			(S) IN	0,1
frequency shore station transmits	(SIGFRQ)		(S) IN	0,1
MMSI code		Unique 9 digit code	TE	0,1
online resource			C	0,*
headline			(S) TE	0,1
linkage		ISO 19115:2014	(S) URI	1,1
name of resource		ISO 19115:2014	(S) TE	0,1
telecommunications			C	0,*
contact instructions			(S) TE	0,1
telecommunication identifier			(S) TE	1,1
telecommunication service		1 : voice 2 : facsimile 3 : SMS 4 : data 5 : streamed data 6 : telex 7 : telegraph 8 : email	(S) EN	0,1
contact address			C	0.*
administrative division			(S) TE	0,1
city name			(S) TE	0,1
country name			(S) TE	0,1

delivery point			(S) TE	0,1
postal code			(S) TE	0,1

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Information	Additional Information (see clause 25.1).	See next row	Association	0,1

Associated to: Administration Area, Airport/Airfield, Anchor Berth, Anchorage Area, Berth, Bridge, Building, Cable Area, Bunker Station, Cable Overhead, Cable Submarine, Cardinal Beacon, Cardinal Buoy, Checkpoint, Coast Guard Station, Communication Area, Conveyor, Crane, Daymark, Dock Area, Dolphin, Dry Dock, Emergency Wreck Marking Buoy, Exceptional Navigation Structure, Ferry Route, Fishing Facility, Floating Dock, Fog Signal, Gate, Harbour Area (Administrative), Harbour Basin, Harbour Facility, Helipad, Installation Buoy, Isolated Danger Beacon, Isolated Danger Buoy, Landmark, Land Region, Lateral Beacon, Lateral Buoy, Light All Around, Light Sectored, Lock Basin, Lock Basin Part, Marine Farm/Culture, Mooring Area, Mooring Buoy, Mooring Trot, Mooring Buoy, Offshore Platform, Offshore Production Area, Pilot Boarding, Pilotage District, Place, Pipeline Overhead, Pipeline Submarine/On Land, Port Area, Production/Storage Area, Radar Range, Radar Station, Radio Calling-In Point, Radio Station, Railway, Refuse Dump, Rescue Station, Runway, Safe Water Beacon, Safe Water Buoy, Seaplane Landing Area, Sensor, Signal Station Traffic, Signal Station Warning, Silo/Tank, Small Craft Facility, Span Fixed, Span Opening, Special Purpose/General Beacon, Special Purpose/General Buoy, Submarine Pipeline Area, Terminal, Tunnel, Turning Basin, Vehicle Transfer, Vessel Traffic Service Area, Waterway Gauge, Wind Turbine

[†] For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

24.1.1 Contact details

If it is required to encode the contact information (communication channel, call sign, radio frequency etc.), it may be done using the information type **Contact Details**. Each instance of **Contact Details** must be associated to the feature(s) to which the information applies using the association **Additional Information** (see clause 25.1).

Remarks:

- The frequency at which vessels receive signals must be populated, where required, using complex attribute **frequency pair**, sub-attribute **frequency shore station transmits**. The frequency at which vessels send signals to shore must be populated, where required, using complex attribute **frequency pair**, sub-attribute **frequency shore station receives**.
- Where required, the values populated within the complex attribute **frequency pair** must be quoted in Hertz, for example a signal frequency of 950 MHz must be encoded as 950000000.

Distinction: Communication Area, Nautical Information.

Inland specific Encoding Instructions:

- If there is a defined area with a reporting requirement or available VHF information services the feature **Communication Area** (see clause 22.13) has to be used. The information feature **Contact Details** is always connected to the geometry of the associated feature.
- Contact details can also be provided in an external XML that is referenced in **file reference** of the respective feature. If the information should be available for maritime vessels it is recommended to use **Contact Details**.
- If contact details are provided as a web service the address can be encoded in the complex attribute **online resource**.

24.2 Service hours

IHO Definition: SERVICE HOURS. The time when a service is available and known exceptions.				
S-401 Information Type: Service Hours ©				
Primitives: No Geometry				
Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol	Type	Multiplicity
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
periodic date range		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
schedule by day of week			C	1,*
category of schedule		: normal operation : closure 3 : unmanned operation	(S) EN	0,1
time intervals by day of week			(S) C	1,*
day of week		: Sunday : Monday : Tuesday : Wednesday : Thursday : Friday 7 : Saturday	(S) EN	0,7 (ordered) †
day of week is range			(S) BO	0,1
time of day end			(S) TI	0,* (ordered) †
time of day start			(S) TI	0,* (ordered) †
information			C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
Direction of Impact	(dirimp)	: Upstream : Downstream : To the Left Bank 4 : To the Right Bank	EN	0,*

type of ship	(shptyp)	: General Cargo Vessel : Container Vessel : Tanker : Sailing Vessel : Fishing Vessel : Special Purpose Vessel : Man of War : Submarine : High Speed Craft 10 : Bulk Carrier 11 : Seaplane 12 : Tugboat 13 : Passenger Vessel 14 : Ferry 15 : Boat	EN	0,* 1
use of ship	(useshp)	: Liner Trade 2 : Occasional Professional Shipping 3 : Leisure	EN	0,*
online resource			C	0,*
headline			(S) TE	0,1
linkage		ISO 19115:2014	(S) URI	1,1
name of resource		ISO 19115:2014	(S) TE	0,1
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Information	Additional Information (see clause 25.1).	See next row	Association	0,1
Associated to: Airport/Airfield, Anchor Berth, Anchorage Area, Berth, Bridge, Building, Bunker Station, Checkpoint, Coast Guard Station, Communication Area, Conveyor, Crane, Dock Area, Dry Dock, Exceptional Navigation Structure, Ferry Route, Floating Dock, Gate, Helipad, Landmark, Lock Basin, Lock Basin Part, Mooring Area, Production/Storage Area, Radio Calling-In Point, Refuse Dump, Runway, Seaplane Landing Area, Sensor, Small Craft Facility, Span Fixed, Span Opening, Terminal, Vehicle Transfer				
† For each instance of time intervals by day of week , at least one of the sub-attributes day of week , time of day start or time of day end must be populated. Where populated, the number of instances of time of day start must be the same as the number of instances of time of day end .				
For each instance of fixed date range , at least one of the sub-attributes date end or date start must be populated.				
For each instance of information , at least one of the sub-attributes file reference or text must be populated.				
24.2.1 Service hours If it is required to encode the time schedules for the operation of a service (for instance the opening and closing times for the opening spans of a bridge), it may be done using the information type Service Hours . Each instance of Service Hours must be associated to the feature(s) to which the information applies using the association Additional Information (see clause 25.1).				
Remarks:				
• The complex attribute time intervals by day of week , sub-attribute day of week is range indicates whether an instance of time intervals by day of week encodes a range of days or discrete days. The day(s) or day range(s) are encoded using sub-attribute day of week . Where day of week is range is populated as <i>True</i> , there must be exactly two instances of the attribute day of week . If day of week is not populated, this indicates that the same schedule applies every day (Monday through				

Sunday). Multiple ranges or mixing range with discrete days(s) is not allowed (if this is required another instance of **time intervals by day of week** must be encoded). See clause 2.4.9.

- Overlapping intervals bound to the same feature using the association **Additional Information** are not permitted.
- The complex attributes **fixed date range** and **periodic date range**, when populated for **Service Hours**, apply only to **Service Hours** and not to any feature that it may be associated with.

Distinction: Nautical Information; Non-Standard Working Day.

Inland specific Encoding Instructions:

- A) Service hours can also be provided in an external XML that is referenced in **file reference** of the respective feature. If the information should be available for maritime vessels it is recommended to use Service Hours.
- B) If service hours are provided as a web service the address can be encoded in the complex attribute **online resource**.

24.3 Non-standard working day

IHO Definition: NON-STANDARD WORKING DAY. Days when many services are not available. Often days of festivity or recreation or public holidays when normal working hours are limited, especially a national or religious festival, etc. (S-127 Edition 1.0.0).				
S-401 Information Type: Non-Standard Working Day (C)				
Primitives: No Geometry				
<i>Real World</i>		<i>Paper Chart Symbol</i>		<i>Inland ECDIS or ECS Symbol</i>
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
date fixed		See clause 2.4.8	TD	0,* †
date variable			TE	0,* †
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
periodic date range		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
information			C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1 †
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Information	Additional Information (see clause 25.1).	See next row	Association	0,1
Associated to: Airport/Airfield, Anchor Berth, Anchorage Area, Berth, Bridge, Building, Bunker Staion, Checkpoint, Coast Guard Station, Communication Area, Conveyor, Crane, Dock Area, Dry Dock, Exceptional Navigation Structure, Ferry Route, Floating Dock, Gate, Helipad, Landmark, Lock Basin, Lock Basin Part, Mooring Area, Production/Storage Area, Radio Calling-In Point, Refuse Dump, Runway, Seaplane Landing Area, Sensor, Small Craft Facility, Span Fixed, Span Opening, Terminal, Vehice Transfer				

[†] At least one of the attributes **date fixed** or **date variable** must be populated.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

24.3.1 Non-standard working days

If it is required to encode the date(s) when an event, festival or national holiday occurs each year, it may be done using the information type **Non-Standard Working Day**. Each instance of **Non-Standard Working Day** must be associated to the feature(s) to which the information applies using the association **Additional Information** (see clause 25.1).

Remarks:

- The attribute **date fixed** encodes the date when a festival or national holiday recurs on the same day each year in the Gregorian calendar.
- The complex **date variable** encodes a day which is not fixed in the Gregorian calendar, for instance “the fourth Thursday in November”; “Easter Sunday”.
- The complex attributes **fixed date range** and **periodic date range**, when populated for **Non-Standard Working Day**, apply only to **Non-Standard Working Day** and not to any feature that it may be associated with.
- The complex attribute **information** (see clause 2.4.6) is used to encode any special conditions or regulations that exist in relation to the date/day populated.

Distinction: Nautical Information; Service Hours.

Inland specific Encoding Instructions:

- A) Non standard working days can also be provided in an external XML that is referenced in **file reference** of the respective feature. If the information should be available for maritime vessels it is recommended to use Non Standard Working Days.
- B) If non standard working days are provided as a web service the address can be encoded in the complex attribute **online resource** of the Information Type **Service Hours**.

24.4 Nautical information

IHO Definition: NAUTICAL INFORMATION. Nautical information about a related area or facility.				
S-401 Information Type: Nautical Information (O)				
Primitives: No Geometry				
<i>Real World</i>		<i>Paper Chart Symbol</i>	<i>Inland ECDIS or ECS Symbol</i>	
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
periodic date range		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
information		See clause 2.4.6	C	0,* [†]
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 [†]
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFOM)		(S) TE	0,1 [†]
pictorial representation	(PICREP)	See clause 2.4.12.2	TE	0,1 [†]
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 [†]
UN Location Code	(unlocl)		TE	0, 1
interoperability identifier		MRN (see clause 27.161)	URN	0, 1
Feature Associations				
S-401 Role	Association Type	Associated to	Type	Multiplicity
The Information	Additional Information (see clause 25.1).	See next row	Association	0,1
Associated to: Administration Area, Airport/Airfield, Anchor Berth, Anchorage Area, Berth, Bollard, Bridge, Building, Built-Up Area, Bunker Station, Cable Area, Cable Overhead, Cable Submarine, Canal, Cardinal Beacon, Cardinal Buoy, Cargo Transhipment Area, Causeway, Caution Area, Checkpoint, Coastline, Coast Guard Station, Collision Regulations Limit, Communication Area, Conveyor, Crane, Current – Non-Gravitational, Custom Zone, Dam, Daymark, Depth Area, Depth Contour, Distance Mark, Dock Area, Dolphin, Dredged Area, Dry Dock, Dumping				

Ground, Dyke, Emergency Wreck Marking Buoy, Exceptional Navigation Structure, Fairway, Fairway System, Fence/Wall, Ferry Route, Fishing Facility, Floating Dock, Fog Signal, Fortified Structure, Foul Ground, Free Port Area, Gate, Gridiron, Harbour Area (Administrative), Harbour Basin, Harbour Facility, Helipad, Hulk, Information Area, Inshore Traffic Zone, Installation Buoy, Isolated Danger Beacon, Isolated Danger Buoy, Lake, Land Area, Land Elevation, Landmark, Land Region, Lateral Beacon, Lateral Buoy, Light Air Obstruction, Light All Around, Light Sectored, Lock Basin, Lock Basin Part, Magnetic Variation, Marine Farm/Culture, Military Practice Area, Mooring Area, Mooring Buoy, Mooring Trot, Navigation Line, Notice Mark, Obstruction, Offshore Platform, Offshore Production Area, Oil Barrier, Physical AIS Aid to Navigation, Pile, Pilotage District, Pilot Boarding Place, Pipeline Overhead, Pipeline Submarine/On Land, Pontoon, Port Area, Precautionary Area, Production/Storage Area, Pylon/Bridge Support, Radar Line, Radar Range, Radar Reflector, Radar Station, Radar Transponder Beacon, Radio Calling-In Point, Radio Station, Railway, Recommended Route Centreline, Recommended Track, Recommended Traffic Lane Part, Refuse Dump, Rescue Station, Restricted Area, River, Road, Runway, Safe Water Beacon, Safe Water Buoy, Sandwave, Sea Area/Named Water Area, Seabed Area, Seagrass, Seaplane Landing Area, Sensor, Shoreline Construction, Signal Station Traffic, Signal Station Warning, Silo/Tank, Slope Topline, Sloping Ground, Small Craft Facility, Sounding, Span Fixed, Span Opening, Special Purpose/General Beacon, Special Purpose/General Buoy, Straight Territorial Sea Baseline, Structure Over Navigable Water, Submarine Pipeline Area, Terminal, Tidal Stream Panel Data, Tidal Stream – Flood/Ebb, Tideway, Separation Zone or Line, Traffic Separation Scheme, Traffic Separation Scheme Boundary, Traffic Separation Scheme Crossing, Traffic Separation Scheme Lane Part, Tunnel, Turning Basin, Two-Way Route, Two-Way Route Part, Underwater/Awash Rock, Unsurveyed Area, Vegetation, Vehicle Transfer, Vessel Traffic Service Area, Water Turbulence, Waterway Area, Waterway Gauge, Weed/Kelp, Wind Turbine, Wreck

[†] At least one of the attributes **information** or **pictorial representation** must be populated.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

24.4.1 Nautical information

If it is required to encode identical information associated with multiple geo features which cannot be encoded using the descriptive attributes on those features, it should be done using the information type **Nautical Information**. Each instance of **Nautical Information** must be associated to the feature(s) to which the information applies using the association **Additional Information** (see clause 25.1).

Remarks:

- Within a dataset, individual instances of information associated with a geo feature which cannot be encoded using the descriptive attributes on the feature should be encoded using the attributes **information** or **pictorial representation** on the feature itself, not using **Nautical Information**. However where this information is shared between features contained in a single dataset, or included in multiple datasets within the IENC portfolio, **Nautical Information** may be used.
- **Nautical Information** must not be used to include a reference to a picture file (attribute **pictorial representation**) to a feature that does not itself include **pictorial representation** as an allowable attribute.
- The complex attributes **fixed date range** and **periodic date range**, when populated for **Nautical Information**, apply only to **Nautical Information** and not to any feature that it may be associated with.

Distinction: Information Area; Update Information.

Inland specific Encoding Instructions:

- A) Encode **feature name** only if the name should be displayed.
- B) Interoperability Identifier should be encoded if the whole association has an own identifier. For the ISRS location code see clause 2.4.13).

24.5 Spatial quality

IHO Definition: **SPATIAL QUALITY.** The indication of the quality of the locational information for features in a dataset.

S-401 Information Type: Spatial Quality (O)

Primitives: No Geometry

Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
quality of horizontal measurement	(QUAPOS)	4 : approximate	EN	0,1 [†]
spatial accuracy			C	0,* [†]
fixed date range		See clause 2.4.8	(S) C	0,1 [†]
date end	(DATEND)		(S) TD	0,1 [†]
date start	(DATSTA)		(S) TD	0,1 [†]
horizontal position uncertainty	(POSACC)		(S) C	0,1
uncertainty fixed			(S) RE	1,1
uncertainty variable factor			(S) RE	0,1
vertical uncertainty	(SOUACC)		C	0,1
uncertainty fixed			(S) RE	1,1
uncertainty variable factor			(S) RE	0,1

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
for the Quality Information	Quality of Bathymetric Data Composition (see clause 25.9)	Quality of Bathymetric Data	Association	0,1
for the Quality Information	Spatial Association (see clause 25.10).	Spatial types (see clause 2.4.7)	Association	0,1

[†] At least one of the attributes **quality of horizontal measurement** or **spatial accuracy** must be encoded.

The sub-complex attribute **fixed date range** is mandatory if more than one instance of the complex attribute **spatial accuracy** is encoded.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

24.5.1 Spatial quality

Spatial attribute types must contain a referenced geometry and may be associated with spatial quality attributes. Each spatial attribute instance must be referenced by a feature instance or another spatial attribute instance.

Spatial quality attributes are carried in the information type **Spatial Quality**. Only point, multipoint and curve geometry and the Meta feature **Quality of Bathymetric Data** can be associated with spatial

quality. Each instance of **Spatial Quality** must be associated to the geometry to which the information applies using the association **Spatial Association** (see clause 25.10); or in the case of **Spatial Quality** associated with **Quality of Bathymetric Data**, using the association **Quality of Bathymetric Data Composition** (see clause 25.9).

Remarks:

- The sub-complex attributes **horizontal position uncertainty** and **vertical uncertainty** must be encoded using either **Spatial Quality** or the Meta feature **Quality of Bathymetric Data** (see clause 3.8) to provide the spatial accuracy components for provision of an overall indication of the quality of bathymetric data for an area. The decision as to which option to use should be based on whether the horizontal position and vertical uncertainty values are specific to a single **Quality of Bathymetric Data** feature or relate to multiple **Quality of Bathymetric Data** features. In general, specific values are related to areas of changeable bathymetry over time or varying bathymetric data quality in the water column (as shown in Figure 3-2 in clause 3.8.1); and common values are specific to general quality uncertainty values in non-changeable areas. It is prohibited to use both options for a single **Quality of Bathymetric Data** instance.
- The complex attribute **spatial accuracy** is used to specify the vertical and horizontal position uncertainty, which may degrade in changeable areas over time. In order to provide the spatial accuracy components for provision of an overall indication of the quality of bathymetric data for an area, an instance of **Spatial Quality** may be associated with one or more instances of **Quality of Bathymetric Data** using the association **Quality of Bathymetric Data Composition** (see clauses 3.8 and 25.9); or encoded using the complex attribute **zone of confidence** on the **Quality of Bathymetric Data** itself. Where the attribute **category of temporal variation** for the associated **Quality of Bathymetric Data** is set to values 2 (likely to change and significant shoaling expected) or 3 (likely to change but significant shoaling not expected) and the spatial accuracy is encoded using **Spatial Quality**, multiple instances of **spatial accuracy** should be encoded to provide an indication of the degradation of the vertical and horizontal position accuracy of the charted bathymetric information over time. Where multiple instances of **spatial quality** are encoded, these must correspond to the number of instances and values (including the zone of confidence categories and date ranges) populated for the complex attribute **zone of confidence** on the associated **Quality of Bathymetric Data** feature.
 - The sub-complex attribute **fixed date range** is used, where required, to define the date range(s) where the spatial accuracy is degraded over time. Where multiple date ranges are specified, the attributes **date start** and **date end** for each instance of **fixed date range** must be equal to the corresponding instances of **zone of confidence (fixed date range)** for the associated **Quality of Bathymetric Data** feature (see clause 3.8).
 - The sub-complex attribute **vertical uncertainty**, where encoded, is used to specify the vertical uncertainty of the depths covered by the associated **Quality of Bathymetric Data** feature within a specified date range (where encoded); and should be adjusted to indicate the degradation of the vertical uncertainty over time where multiple instances of **zone of confidence** are encoded (see above). When **depth range minimum value** is specified for the associated **Quality of Bathymetric Data** feature, **vertical uncertainty** refers only to the uncertainty of the swept depth defined by **depth range minimum value**.
 - The sub-complex attribute **horizontal position uncertainty**, where encoded, is used to specify the positional uncertainty of the depths covered by the associated **Quality of Bathymetric Data** feature within a specified date range (where encoded); and should be adjusted to indicate the degradation of the horizontal position uncertainty over time where multiple instances of **zone of confidence** are encoded (see above).
 - The sub-attribute **quality of horizontal measurement** must not be populated for **Spatial Quality** associated to **Quality of Bathymetric Data**.
- For the geometry associated with **Obstruction**, **Sounding**, **Underwater/Awash Rock** and **Wreck** features, an instance of **Spatial Quality** using the association **Spatial Association** (see clause 25.10) may be associated to indicate, where required, that the horizontal position and/or the vertical uncertainty for the associated feature is of different (higher or lower) accuracy than indicated by

the underlying **Quality of Bathymetric Data** Meta feature. Where **Spatial Quality** is associated to **Obstruction**, **Underwater/Awash Rock** or **Wreck** and attribute **height** or **value of sounding** is populated with an empty (null) value, the value for the attribute **vertical uncertainty (uncertainty fixed)** on the associated **Spatial Quality**, where required, must also be populated as empty (null). See also clause 3.8.1.3(Sounding uncertainty).

The attribute **quality of horizontal measurement** may be used on **Spatial Quality** to provide an indication of lower accuracy quality of depth features, in addition to population of **horizontal position accuracy**, than the underlying **Quality of Bathymetric Data** indicates, however where this is done the **Spatial Quality** feature must not be associated to a **Quality of Bathymetric Data** feature.

Distinction: Quality of Bathymetric Data; Quality of Non-Bathymetric Data; Quality of Survey.

Inland specific Encoding Instructions:

24.6 Time Schedule - In General

IHO Definition: A schedule listing events and the times at which they will take place.				
S-401 Information Type: Time Schedule - In General (tisdge) (C)				
Super Type:				
Primitives: No Geometry				
Real World	Paper Chart Symbol	Inland ECDIS or ECS Symbol		
 <p>Wasser- und Schifffahrtsamt Bremenshütte</p> <p>Betriebszeiten der Schleusen</p> <p>Wasser- und Schifffahrtsamt Bremenshütte</p> <p>Zeitraum: 08.08.-08.09.2018</p> <p>Zeitraum: 08.08.18 bis 08.09.18</p> <p>Zeitraum für Rücksichtnahme: 08.08.-12.09.2018</p> <p>Zeitraum, Minus und Rücksichtnahme: 08.08.-12.09.2018</p> <p>Zeitraum: 08.08.-12.09.2018</p> <p>Zeitraum für Rücksichtnahme: 08.08.-12.09.2018</p> <p>Zeitraum, Minus und Rücksichtnahme: 08.08.-12.09.2018</p> <p>Zeitraum: 08.08.-12.09.2018</p> <p>Zeitraum für Rücksichtnahme: 08.08.-12.09.2018</p> <p>Zeitraum, Minus und Rücksichtnahme: 08.08.-12.09.2018</p>				
S-401 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Direction of Impact	(dirimp)	1 : Upstream 2 : Downstream 3 : To the Left Bank 4 : To the Right Bank	EN	0, *
Reported Date	(SORDAT)		TD	0, 1
Status	(STATUS)	5 : Periodic/Intermittent	EN	0, 1
Average Passing Time Reference	(aptref)		TE	0, 1
Category of Time and Behaviour	(cattab)	1 : Operational Period 2 : Non-Operational Period	EN	1, 1
Time Schedule Reference	(schref)		TE	1, 1
Type of Ship	(shptyp)	1 : General Cargo Vessel 2 : Container Vessel 3 : Tanker 4 : Sailing Vessel 5 : Fishing Vessel 6 : Special Purpose Vessel 7 : Man of War 8 : Submarine 9 : High Speed Craft 10 : Bulk Carrier 11 : Seaplane 12 : Tugboat 13 : Passenger Vessel 14 : Ferry 15 : Boat	EN	0, *
Use of Ship	(useshp)	1 : Liner Trade 2 : Occasional Professional Shipping 3 : Leisure	EN	0, *
Source Indication			C	0, 1
Reported Date			(S) TD	0, 1
Category of Authority		2 : Border Control 3 : Police 4 : Port 5 : Immigration 6 : Health	(S) EN	0, 1

		7 : Coast Guard 8 : Agricultural 9 : Military 10 : Private Company 11 : Maritime Police 12 : Environmental 13 : Fishery 14 : Finance 15 : Maritime 16 : Customs		
.....Country Name			(S) TE	0, 1
Source Type		1 : Law or Regulation 2 : Official Publication 7 : Mariner Report, Confirmed 8 : Mariner Report, Not Confirmed 9 : Industry Publications and Reports 10 : Remotely Sensed Images 11 : Photographs 12 : Products Issued by HO Services 13 : News Media 14 : Traffic Data	(S) EN	0, 1
.....Source	(SORIND)		(S) TE	1, *
feature name		See clause 2.5.8	(S) C	0, *
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
name usage		1 : default name display 2 : alternate name display	(S) EN	0,1 †

Feature Associations

S-401 Role	Association Type	Associated to	Type	Multiplicity
The Information	Additional Information (see clause 25.1).	See next row	Association	0, *

Associated to: Anchor Berth, Anchorage Area, Berth, Bunker Station, Checkpoint, Coast Guard Station, Dry Dock, Exceptional Navigation Structure, Ferry Route, Floating Dock, Gate, Lock Basin, Lock Basin Part, Mooring Area, Refuse Dump, Seaplane Landing Area, Small Craft Facility, Span Opening, Terminal, Vehicle Transfer,

Inland specific encoding instructions:

- Encoded without dedicated spatial reference. Always associated with respective feature (see below).
- Operating hours should be included in at least all movable bridges and all locks, even if these are operated 24 hours a day 7 days a week all year round.
- Operating hours should preferably be added for all other features that have limited operating/availability hours (Offices of waterway authorities, harbor masters, police, etc. / bunker services, fresh water supplies, refuse dumps, etc. / terminals, berths, pontoons, etc.)
- Detailed schedule information is contained in external file. The attribute **time schedule reference** (schref) contains the respective reference.

- E) If there are different time schedules for different ship types or usages of ships, or there are different categories of time and behavior, several **Time Schedule – In General** (tisdge) features must be used.
- F) Information about average passing times is encoded in an additional external file. The file name is encoded in the **average passing time reference** (aptref) attribute
- G) Operating times have to be encoded in local time.
- H) EUR: Time schedules must be encoded, however if the same time schedule applies to all kinds of vessels the reference to the external XML file can be encoded in the **file reference** (TXTDSC) attribute of the feature itself. It is not necessary to encode the **Time Schedule – In General** (tisdge) feature in this case. Alternatively or additionally the features Service Hours and Non Standard Working Days can be encoded and associated.

25 Association Names

The following diagrams are examples to demonstrate the structure of the feature/feature and feature/information association tables included in the following clauses, as they may be correspondingly represented in UML. The examples are taken from the UML Relationship Diagram for the feature **Two Way Route Part**. The complete relationship diagram is shown in Figure 25-1 below.

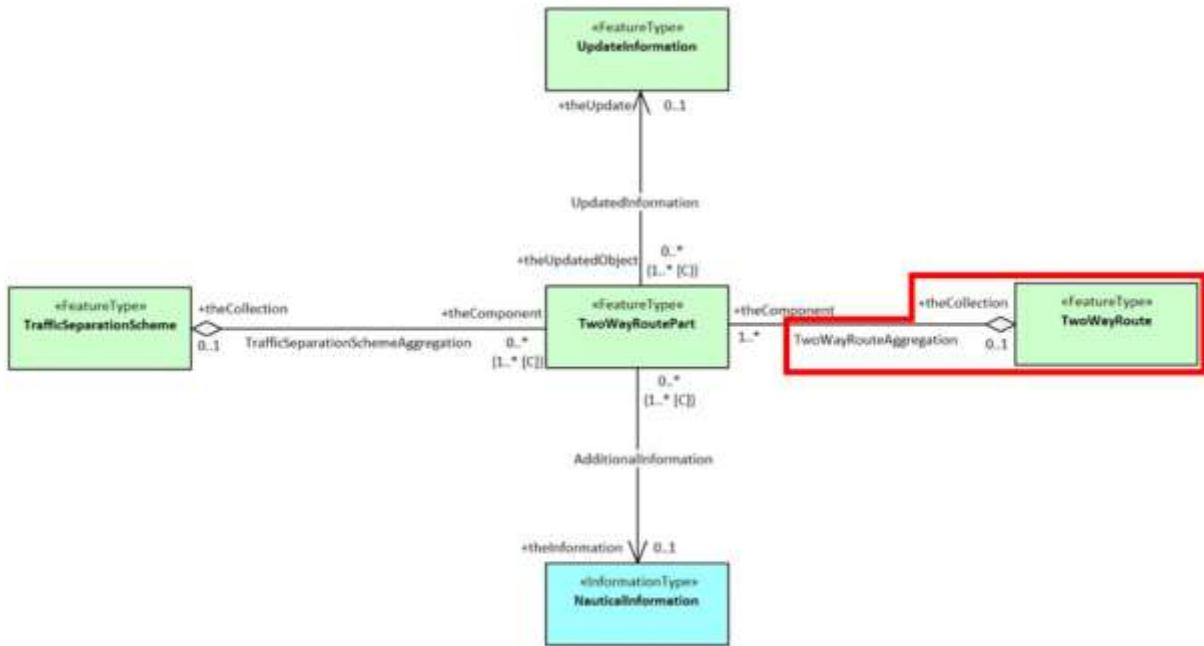


Figure 25-1 – Two-Way Route Part UML relationship diagram

NOTE: The association **Spatial Association** (see clause 25.10) is not included in Figure 25-1 above, as this association identifies the relationship between an information type (**Spatial Quality**) and the spatial type to which a feature is bound (that is, the geometry to which the feature is bound, rather than the feature itself).

The tables included in this Section are structured such that each row of the table shows all components of the relationship as they would be included at the association end for the entries included in the “Associated With” column. For example, for the **Two Way Route** end of the **Two-Way Route Aggregation** association (indicated by the red outline included in Figure 25-1 above), the “Role Type” is *Aggregation*; the “Role” is *The Collection*; and the “Multiplicity” is *0,1* (see clause 25.19):

Role Type	Role	Associated With	Multiplicity
Aggregation	The Collection	Two-Way Route	0,1

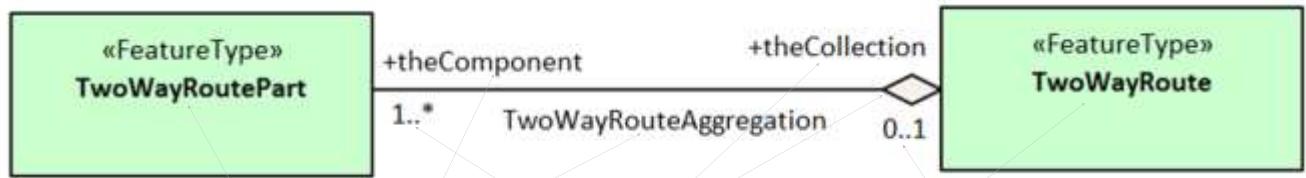
Within the tables included in this Section, features are grouped in separate table entries where the features included at either end of the relationship may differ for the association. For example Figure 25-2* below shows that, for the feature/information association **Additional Information**, the feature **Anchor Berth** may be associated with any of the information types **Contact Details**, **Non-Standard Working Day**, **Service Hours** or **Nautical Information**; while the feature **Two Way Route Part** may only be associated with the information type **Nautical Information** (as shown in Figure 25-1 above and Figure 25-5).

* Figure 25-2 is derived from clause 25.1.

IHO Definition: ADDITIONAL INFORMATION. A feature association for the binding between at least one instance of a geo feature and an instance of an information type.			
Remarks:			
<ul style="list-style-type: none"> The features comprising an Additional Information association must, if required, include at least one of any of the geo features included in the following lists associated to one or more of the corresponding information types included in the “The Information” role. 			
Role Type	Role	Associated With	Multiplicity
Association	Information	Contact Details, Non-Standard Working Day, Service Hours, Nautical Information, Time Schedule In General	0,1
		Airport/Airfield, Anchor Berth, Anchorage Area, ...	0,*
Role Type	Role	Associated With	Multiplicity
Association	Information	Contact Details, Nautical Information	0,1
		Administration Area, ..., Wind Turbine	0,*
Role Type	Role	Associated With	Multiplicity
Association	Information	Nautical Information	0,1
		..., Two-Way Route, Two-Way Route Part, Underwater/Awash Rock, ...	0,*

Figure 25-2 – Example of different allowable Additional Information associations

Figure 25-3 below shows the representation of the feature/feature association **Two Way Route Aggregation** for the **Two-Way Route Part** feature (see clause 25.15).



IHO Definition: TWO-WAY-ROUTE AGGREGATION. A feature association for the binding between a two-way route and its component features.

Remarks:

- A **Two-Way Route Aggregation** must, if required, include at least one **Two-Way Route Part** feature associated to a **Two-Way Route** feature.
- The **Two-Way Route** may additionally be associated to the aids to navigation marking the components of the Route using the association **Aids to Navigation Association** (see clause 25.2).

Role Type	Role Type	Role Type	Role Type
Aggregation	The Collection	Two-Way Route	0,1
Association	The Component	Two-Way Route Part	1,*

Figure 25-3 – Two-Way Route Aggregation

In Figure 25-3 above, the table should be interpreted as follows:

- A **Two-Way Route** instance, if it exists, *aggregates* (or is the container for) *the collection* of one or more **Two-Way Route Part** features.
- A **Two-Way Route Part** instance is *the component* (or is a containee) of a **Two-Way Route** feature, if the **Two-Way Route Aggregation** association is created.
- The *1,** multiplicity at the **Two-Way Route Part** end of the relationship indicates that, where a **Two-Way Route Aggregation** exists, there must be at least one **Two-Way Route Part** feature included in the **Two-Way Route Aggregation**. **NOTE:** This does not mean that all encoded instances of **Two-Way Route Part** must be included in a **Two-Way Route Aggregation** (see next bullet).
- The *0,1* multiplicity at the **Two-Way Route** end of the relationship indicates that there is no requirement to bind each **Two-Way Route Part** feature to an instance of **Two-Way Route** using a **Two-Way Route Aggregation** (due to the lower multiplicity being zero). However, where the relationship exists, there must be exactly one **Two-Way Route** feature included in the association.

Figure 25-4 below shows the representation of the feature/feature association **Traffic Separation Scheme Aggregation** for the **Two-Way Route Part** feature (see clause 25.14).



IHO Definition: **TRAFFIC SPARATION SCHEME AGGREGATION.** A feature association for the binding between a Traffic Separation Scheme or a Traffic Separation Scheme System and its component features.

Remarks:

- A **Traffic Separation Scheme Aggregation** must, if required, include at least one of any of the features shown in the “The Component” role below in upright text associated to a **Traffic Separation Scheme** feature.
- The **Traffic Separation Scheme** may additionally be associated to the aids to navigation marking the components of the Scheme using the association **Aids to Navigation Association** (see clause 25.2).

Role Type	Role	Associated With	Multiplicity
Aggregation	The Collection	Traffic Separation Scheme	0,1
Association	The Component	Inshore Traffic Zone, Landmark, Pile, Precautionary Area, Restricted Area , Separation Zone or Line, Traffic Separation Scheme, Traffic Separation Scheme Boundary, Traffic Separation Scheme Crossing, Traffic Separation Scheme Lane Part, Two-Way Route, Two-Way Route Part	0,*

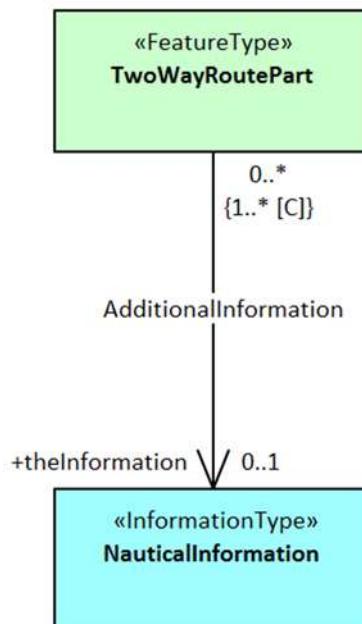
Figure 25-4 – Traffic Separation Scheme Aggregation

The components of the feature/feature association **Traffic Separation Scheme Aggregation** should be interpreted as for the corresponding components of the feature/feature association **Two-Way Route Aggregation** described for Figure 25-3, except for the multiplicity at the **Two-Way Route Part** end of the association (indicated with the arrow in Figure 25-4). The multiplicity as indicated in the UML as “**0..* {1..* [C]}**” in this case is an example of “collective multiplicity” notation. Collective multiplicities are described in the following clauses in the Remarks section of the tables.

- A collective multiplicity can only exist when there is more than one feature type that may be used in a given role. A collective multiplicity indicates the multiplicity of the collection.
- The “**0..***” component of the multiplicity shown in the UML in this example is the “individual multiplicity”. An individual multiplicity indicates the multiplicity for each component of the collection, and in this example indicates that that none of the listed features are required to be included.
- The collective component of the multiplicity (**{1..* [C]}** in the UML) indicates that where the association **Traffic Separation Scheme Aggregation** exists, there must be at least one of any of the features (collectively) that may be included as “containees”. The allowable list of features is included in the following table entries, noting in this example that at least one instance of **Two-Way Route Part** is allowable, if required, for the **Traffic Separation Scheme Aggregation** (as highlighted in Figure 25-4).
- The individual component of the multiplicity (**0,***) indicates there is no requirement for a **Two-Way Route Part** feature (or any other feature in the list) to be included in a **Traffic Separation Scheme Aggregation** (due to the lower multiplicity being zero). However where the relationship exists, there may be an unlimited number of **Two-Way Route Part** features or any other feature included in the list (due to the upper multiplicity being “*****”).
- Upright style (non-italicized) features in the tables are members of the collective multiplicity, italicized features are not. The individual multiplicity applies to all listed features; the collective multiplicity only applies to the upright features, which may or may not comprise the entire list.

The Tables in this Section show only the individual multiplicity in the “Multiplicity” column. The indication of collective multiplicity is included in the Remarks (in Figure 25-4 above, the Remark “**A Traffic Separation Scheme Aggregation** must, if required, include at least one of any of the features shown in the “The Component” role below in upright text associated to a **Traffic Separation Scheme** feature” indicates the collective multiplicity).

Figure 25-5 below shows the representation of the feature/information association **Additional Information** for the **Two-Way Route Part** feature (table derived from clause 25.1).



IHO Definition: ADDITIONAL INFORMATION. A feature association for the binding between at least one instance of a geo feature and an instance of an information type.

Remarks:

- The features comprising an **Additional Information** association must, if required, include at least one of any of the geo features included in the following list associated to one or more of the corresponding information types included in the “The Information” role.

Role Type	Role	Associated With	Multiplicity
Association	The information	Nautical Information	0,1
		..., Two-Way Route , Two-Way Route Part , Underwater/Awash Rock , Unsurveyed Area , Vegetation , Water Turbulence , Weed/Kelp , Wreck	0,*

Figure 25-5 – Additional Information

The only additional characteristic to note in Figure 25-5, which is characteristic of all feature/information associations, is that unlike feature/feature associations, feature/information associations have only one role (at the information feature end of the relationship).

Within the feature tables included in Sections 3 to 24 of this document, a description of the associations as relevant to each individual feature has also been included. Figure 25-6 below shows an example as included for the feature **Lateral Buoy** (see clause 20.1); and guidance as to how to interpret these tables.

Feature Associations				
S-401 Role⁽⁴⁾	Association Type⁽¹⁾	Associated to⁽²⁾	Type⁽³⁾	Multiplicity⁽⁵⁾
The Structure	Structure/Equipment (see clause 25.12)	Daymark, Distance Mark, Fog Signal, Light All Around, Physical AIS Aid to Navigation, Radar Transponder Beacon, Signal Station Traffic, Signal Station Warning	Composition	0,1
The Component	Aids to Navigation Association (see clause 25.2)	Fairway System, Traffic Separation Scheme, Two-Way Route	Association	0,*
The Auxiliary Feature	Fairway Auxiliary (see clause 25.6)	Fairway	Association	0,*
The Updated Object	Updated Information (see clause 25.16)	Update Information	Association	0,*
The Position Provider	Text Association (see clause 25.13).	Text Placement	Composition	0,1
-	Additional Information (see clause 25.1)	Contact Details, Nautical Information	Association	0,*
-	Spatial Association (see clause 25.10)	Spatial Quality	Association	0,*

Figure 25-6 – Example of associations applicable to individual features – Lateral Buoy

Each row included in Figure 25-6 above describes a S-\$01 association instance that may be created and include one or more instances of the feature type **Lateral Buoy** as a member; and is structured such that all components of the association are grouped as they would appear at the end of the association containing **Lateral Buoy** (see Figure 25-1 and associated guidance).

- (1) The name of the association as specified in the following clauses.
- (2) The list of features that **Lateral Buoy** may be associated to for the association (in UML terms, the list of features at the “other end” of the association).
- (3) The type of association as defined for the **Lateral Buoy** end of the association – “Association”, “Aggregation” or “Composition” as described in S-100 Part 1, clause 1-4.9; and included in the tables in this Section in the “Role Type” column. NOTE: The association type for a feature/information association will always be “Association”.
- (4) The role name as defined for the **Lateral Buoy** end of the association and as described in Section 26; and included in the tables in this Section in the “Role” column. NOTE: a dash “-“ in this column indicates the one-way nature of a feature/information association – the role name is included at the information end of the association only.
- (5) The multiplicity as defined for the **Lateral Buoy** end of the association and included in the tables in this Section in the “Multiplicity” column. For **Lateral Buoy**, these multiplicities are interpreted as follows:
 - 0,1 for the **Structure/Equipment** association means that a **Lateral Buoy** can exist in isolation (lower multiplicity 0) but, if the association exists, exactly one instance of **Lateral Buoy** must be included in the “The Structure” role of type Composition. The same principle applies for the **Text Association** association.
 - 0,* means that a **Lateral Buoy** can exist in isolation (lower multiplicity 0) but, if the association exists, one or more instances of **Lateral Buoy** may (but are not required) to be included in the association. In general this is an indication of “collective multiplicity” (see Figure 15-4 above and associated guidance).

25.1 Additional information

IHO Definition: **ADDITIONAL INFORMATION.** A feature association for the binding between at least one instance of a geo feature and an instance of an information type.

Remarks:

- The features comprising an **Additional Information** association must, if required, include at least one of any of the geo features included in the following lists associated to one or more of the corresponding information types included in the “The Information” role.

Role Type	Role	Associated With	Multiplicity
Association	The Information	Contact Details, Non-Standard Working Day, Service Hours, Nautical Information, Time Schedule In General	0,1
		Airport/Airfield, Anchor Berth, Anchorage Area, Berth, Bridge, Building, Bunker Station, Checkpoint, Coast Guard Station, Communication Area, Conveyor, Crane, Dock Area, Dry Dock, Exceptional Navigation Structure, Ferry Route, Floating Dock, Gate, Helipad, Landmark, Lock Basin, Lock Basin Part, Mooring Area, Production/Storage Area, Radio Calling-In Point, Refuse Dump, Runway, Seaplane Landing Area, Sensor, Small Craft Facility, Span Fixed, Span Opening, Terminal, Vehicle Transfer	0,*
Role Type	Role	Associated With	Multiplicity
Association	The Information	Contact Details, Nautical Information	0,1
		Administration Area, Cable Area, Cable Overhead, Cable Submarine, Cardinal Beacon, Cardinal Buoy, Daymark, Dolphin, Emergency Wreck Marking Buoy, Fishing Facility, Fog Signal, Harbour Area (Administrative), Harbour Basin, Harbour Facility, Installation Buoy, Isolated Danger Beacon, Isolated Danger Buoy, Land Region, Lateral Beacon, Lateral Buoy, Light All Around, Light Sectored, Marine Farm/Culture, Mooring Buoy, Mooring Trot, Offshore Platform, Offshore Production Area, Pilot Boarding Place, Pilotage District, Pipeline Overhead, Pipeline Submarine/On Land, Port Area, Radar Range, Radar Station, Radio Station, Railway, Rescue Station, Safe Water Beacon, Safe Water Buoy, Signal Station Traffic, Signal Station Warning, Silo/Tank, Special Purpose/General Beacon, Special Purpose/General Buoy, Submarine Pipeline Area, Tunnel, Turning Basin, Vessel Traffic Service Area, Waterway Gauge, Wind Turbine	0,*
Role Type	Role	Associated With	Multiplicity
Association	The Information	Nautical Information	0,1
		Bollard, Built-Up Area, Canal, Cargo Transhipment Area, Causeway, Caution Area, Coastline, Collision Regulations Limit, Current – Non-Gravitational, Custom Zone, Dam, Depth Area, Depth Contour, Distance Mark, Dredged Area, Dumping Ground, Dyke, Fairway, Fairway System, Fence/Wall, Fishery Zone, Fortified Structure, Foul Ground, Free Port Area, Gridiron, Hulk, Information Area, Inshore Traffic Zone, Lake, Land Area, Land Elevation, Light Air Obstruction, Magnetic Variation, Military Practice Area, Navigation Line, Obstruction, Oil Barrier, Physical AIS Aid to Navigation, Pile, Pontoon, Precautionary Area, Pylon/Bridge Support, Radar Line, Radar Reflector, Radar Transponder Beacon, Recommended Route Centreline, Recommended Track, Recommended Traffic Lane Part, Restricted Area, River, Road, Sandwave, Sea Area/Named Water Area, Seabed Area, Seagrass, Shoreline Construction, Slope Topline, Sloping Ground, Sounding, Straight Territorial Sea Baseline, Structure Over Navigable Water, Tidal Stream Panel Data, Tidal Stream – Flood/Ebb, Tideway, Separation Zone or Line, Traffic Separation Scheme, Traffic Separation Scheme Boundary,	0,*

	Traffic Separation Scheme Crossing, Traffic Separation Scheme Lane Part, Two-Way Route, Two-Way Route Part, Underwater/Awash Rock, Unsurveyed Area, Vegetation, Water Turbulence, Waterway Area, Weed/Kelp, Wreck	
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25.2 Aids to navigation association

IHO Definition: **AIDS TO NAVIGATION ASSOCIATION.** A feature association for the binding between navigational aids and the traffic systems (such as routeing measures) that they define.

Remarks:

- The features comprising an **Aids to Navigation Association** must, if required, include at least one of any of the features included in the “The Component” role associated to one or more of the corresponding features in the “The Collection” role.

Role Type	Role	Associated With	Multiplicity
Aggregation	The Collection	Fairway System, Traffic Separation Scheme, Two-Way Route	0,1
Association	The Component	Building, Cardinal Beacon, Cardinal Buoy, Crane, Daymark, Dolphin, Fishing Facility, Fortified Structure, Isolated Danger Beacon, Isolated Danger Buoy, Landmark, Lateral Beacon, Lateral Buoy, Offshore Platform, Pile, Safe Water Beacon, Safe Water Buoy, Silo/Tank, Special Purpose/General Beacon, Special Purpose/General Buoy, Wind Turbine	0,*
Role Type	Role	Associated With	Multiplicity
Aggregation	The Collection	Fairway System, Traffic Separation Scheme, Two-Way Route	0,1
Association	The Component	Bridge, Conveyor, Floating Dock, Hulk, Pipeline Overhead, Pontoon, Pylon/Bridge Support, Shoreline Construction, Span Fixed, Span Opening, Structure Over Navigable Water	0,*

25.3 Bridge aggregation

IHO Definition: **BRIDGE AGGREGATION.** A feature association for the binding between a bridge and its component features.

Remarks:

- The features comprising a **Bridge Aggregation** must, if required, include at least one **Span Fixed** or **Span Opening** feature associated to a **Bridge** feature.
- A bridge over non-navigable water at the optimum display scale of the IENC data, which does not require its individual components to be encoded, must be encoded, where required, as a **Bridge** feature of type curve or surface (see clause 6.6).

Role Type	Role	Associated With	Multiplicity
Aggregation	The Collection	Bridge	0,1

Association	The Component	Cable Overhead, Communication Area, Lateral Buoy, Notice Mark, Pipeline Overhead, Pontoon, Pylon/Bridge Support, Radar Reflector, Radio Calling-In Point, Shoreline Construction, Signal Station Traffic, Signal Station Warning, Span Fixed, Span Opening, Two Way Route Part, Waterway Gauge	0,*
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25.4 Caution area association

IHO Definition: **CAUTION AREA ASSOCIATION.** A feature association for the binding between a caution area and the traffic systems (such as routeing measures) to which the cautionary information applies.

Remarks:

- A **Caution Area Association** must, if required, include at least one **Traffic Separation Scheme** feature associated to a **Caution Area** feature.

Role Type	Role	Associated With	Multiplicity
Aggregation	The Collection	Caution Area	0,1
Association	The Component	Traffic Separation Scheme	0,*

25.5 Fairway aggregation

IHO Definition: **FAIRWAY AGGREGATION.** A feature association for the binding between related fairways comprising a fairway system.

Remarks:

- A **Fairway Aggregation** must, if required, include at least two **Fairway** features associated to a **Fairway System** feature. Note, however, that within a single dataset the **Fairway Aggregation** may contain only a single **Fairway** feature due to splitting the fairway system at the IENC cell limits.
- The **Fairway System** may additionally be associated to the aids to navigation marking the components of the fairway using the association **Aids to Navigation Association** (see clause 25.2).

Role Type	Role	Associated With	Multiplicity
Aggregation	The Collection	Fairway System	0,1
Association	The Component	Fairway	0,*

25.6 Fairway auxiliary

IHO Definition: **FAIRWAY AUXILIARY**. A feature association for the binding between a fairway and related features auxiliary to the fairway.

Remarks:

- The features comprising a **Fairway Auxiliary** association must include, if required, at least one of any of the features included in the “The Auxiliary Feature” role associated to one **Fairway** feature.

Role Type	Role	Associated With	Multiplicity
Aggregation	The Primary Feature	Fairway	0,1
Association	The Auxiliary Feature	Cardinal Beacon , Cardinal Buoy , Caution Area , Daymark , Dredged Area , Isolated Danger Beacon , Isolated Danger Buoy , Lateral Beacon , Lateral Buoy , Landmark , Notice Mark , Pile , Recommended Route Centreline , Recommended Track , Restricted Area , Safe Water Beacon , Safe Water Buoy , Special Purpose/General Beacon , Special Purpose/General Buoy ,	0,*

25.7 Mooring trot aggregation

IHO Definition: **MOORING TROT AGGREGATION**. A feature association for the binding between a mooring trot and its component parts.

Remarks:

- Typically, a mooring trot will consist of:
 - o At least one **Berth** feature;
 - o At least 2 **Cable Submarine** features;
 - o At least 2 **Mooring Buoy** features; and
 - o At least 2 **Obstruction** features.

A **Mooring Trot Aggregation** must, if required, include at least one of any of the features shown in the “The Component” role below associated to a **Mooring Trot** feature.

Role Type	Role	Associated With	Multiplicity
Aggregation	The Collection	Mooring Trot	0,1
Association	The Component	Berth , Cable Submarine , Mooring Buoy , Obstruction	0,*

25.8 Pilotage district association

IHO Definition: **PILOTAGE DISTRICT ASSOCIATION**. A feature association for the binding between a pilotage district and its component pilot boarding places.

Remarks:

- A **Pilotage District Association** must, if required, include at least one **Pilot Boarding Place** feature associated to a **Pilotage District** feature.

Role Type	Role	Associated With	Multiplicity
Aggregation	The Collection	Pilotage District	0,1

Association	The Component	Pilot Boarding Place	0,*
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25.9 Quality of bathymetric data composition

IHO Definition: **QUALITY OF BATHYMETRIC DATA COMPOSITION.** The mandatory association between the quality-related characteristics of bathymetric data and the horizontal position and vertical uncertainties of the data.

Remarks:

- A **Quality of Bathymetric Data Composition** must, if required, include at least one **Quality of Bathymetric Data** feature associated to a **Spatial Quality** feature.

Role Type	Role	Associated With	Multiplicity
Association	The Quality Information	Spatial Quality	0,1
		Quality of Bathymetric Data	0,*

25.10 Roofed Structure Aggregation

IHO Definition: **ROOFED STRUCTURE AGGREGATION.** A feature association for the binding between a roofed structure over navigable water and its supporting features.

Remarks:

- A **Roofed Structure Aggregation** must, if required, include at least one **Pylon/Bridge Support** feature associated to a **Structure Over Navigable Water** feature.

Role Type	Role	Associated With	Multiplicity
Aggregation	The Roofed Structure	Structure Over Navigable Water	0,1
Association	The Support	Pylon/Bridge Support	0,*

25.11 Spatial association

IHO Definition: **SPATIAL ASSOCIATION.** An association for the binding between a spatial type and its spatial quality information.

Remarks:

- A **Spatial Association** must, if required, include at least one spatial type instance associated to a **Spatial Quality** information feature. Note that where multiple features are associated with a spatial type instance, the spatial quality applies to all these features.
- For geometric primitive surface, the **Spatial Quality** must, if required, be associated to the relevant curves comprising the spatial edges (boundaries) of the surface.

Role Type	Role	Associated With	Multiplicity
Association	The Quality Information	Spatial Quality	0,1

	Spatial types (see clause 2.4.7)	0,*
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25.12 Structure/equipment

IHO Definition: **STRUCTURE/EQUIPMENT**. A feature association for the binding between a navigation aid equipment feature and the structure that supports it.

Remarks:

- The features comprising an **Structure/Equipment** association must, if required, include at least one of any of the features included in the “The Equipment” role associated to exactly one of the corresponding features in the “The Structure” role.

Role Type	Role	Associated With	Multiplicity
Composition	The Structure	Bridge, Building, Crane, Cardinal Beacon, Cardinal Buoy, Conveyor, Dolphin, Emergency Wreck Marking Buoy, Exceptional Navigation Structure, Fishing Facility, Floating Dock, Fortified Structure, Hulk, Installation Buoy, Isolated Danger Beacon, Isolated Danger Buoy, Landmark, Lateral Beacon, Lateral Buoy, Mooring Buoy, Offshore Platform, Pile, Pontoon, Pylon/Bridge Support, Safe Water Beacon, Safe Water Buoy, Shoreline Construction, Silo/Tank, Span Fixed, Span Opening, Special Purpose/General Beacon, Special Purpose/General Buoy, Structure Over Navigable Water, Wind Turbine, Wreck	0,1
Association	The Equipment	Daymark, Distance Mark, Fog Signal, Light All Around, Notice Mark, Physical AIS Aid to Navigation, Radar Transponder Beacon, Signal Station Traffic, Signal Station Warning	0,*
Role Type	Role	Associated With	Multiplicity
Composition	The Structure	Bridge, Building, Crane, Cardinal Beacon, Conveyor, Dolphin, Fishing Facility, Fortified Structure, Isolated Danger Beacon, Landmark, Lateral Beacon, Offshore Platform, Pile, Pipeline Overhead, Pylon/Bridge Support, Safe Water Beacon, Shoreline Construction, Silo/Tank, Span Fixed, Span Opening, Special Purpose/General Beacon, Structure Over Navigable Water, Wind Turbine, Wreck	0,1
Association	The Equipment	Light Sectored	0,*
Role Type	Role	Associated With	Multiplicity
Composition	The Structure	Dolphin, Fortified Structure, Hulk, Landmark, Offshore Platform, Pile, Pylon/Bridge Support, Shoreline Construction	0,1
Association	The Equipment	Bollard	0,*
Role Type	Role	Associated With	Multiplicity
Composition	The Structure	Bridge, Building, Crane, Conveyor, Landmark, Offshore Platform, Pylon/Bridge Support, Span Fixed, Span Opening, Wind Turbine	0,1
Association	The Equipment	Light Air Obstruction	0,*
Role Type	Role	Associated With	Multiplicity

Composition	The Structure	Light All Around, Light Sectored ³	0,1
Association	The Equipment	Fog Signal, Light Air Obstruction, Light All Around, Light Sectored, Radar Transponder Beacon	0,*
Role Type	Role	Associated With	Multiplicity
Composition	The Structure	Daymark	0,1
Association	The Equipment	Distance Mark, Fog Signal, Light All Around, Light Sectored, Physical AIS Aid to Navigation, Radar Transponder Beacon, Signal Station Traffic, Signal Station Warning	0,*
Role Type	Role	Associated With	Multiplicity
Composition	The Structure	Building, Landmark, Offshore Platform	0,1
Association	The Equipment	Helipad	0,*
Role Type	Role	Associated With	Multiplicity
Composition	The Structure	Bridge, Light All Around, Light Sectored, Span Fixed, Span Opening	0,1
Association	The Equipment	Sensor	0,*

25.13 Text association

IHO Definition: **TEXT ASSOCIATION.** A feature association for the binding between a geo feature and the cartographically positioned location for text.

Remarks:

- The features comprising a **Text Association** must, if required, include exactly one of any of the features included in the “The Position Provider” role associated to up to two **Text Placement** features, which cannot exist outside **Text Association**.

Role Type	Role	Associated With	Multiplicity

³ See clauses 18.2 and 19.1.8.

Composition	The Position Provider	Administration Area, Airport/Airfield, Anchor Berth, Anchorage Area, Berth, Bollard, Bridge, Building, Built-Up Area, Bunker Station, Cable Area, Cable Overhead, Cable Submarine, Canal, Cardinal Beacon, Cardinal Buoy, Cargo Transhipment Area, Causeway, Checkpoint, Coast Guard Station, Coastline, Collision Regulations Limit, Communication Area, Conveyer, Crane, Current – Non-Gravitational, Dam, Daymark, Distance Mark, Dock Area, Dolphin, Dredged Area, Dry Dock, Dumping Ground, Dyke, Emergency Wreck Marking Buoy, Exceptional Naviagtion Structure, Fairway, Fairway System, Fence/Wall, Ferry Route, Fishery Zone, Fishing Facility, Floating Dock, Fog Signal, Fortified Structure, Foul Ground, Free Port Area, Gate, Gridiron, Harbour Area (Administrative), Harbour Basin, Harbour Facility, Helipad, Hulk, Information Area, Installation Buoy, Isolated Danger Beacon, Isolated Danger Buoy, Lake, Land Area, Land Elevation, Land Region, Landmark, Lateral Beacon, Lateral Buoy, Light Air Obstruction, Light All Around, Light Sectored, Lock Basin, Lock Basin Part, Marine Farm/Culture, Maximum Permitted Ship Dimensions, Maximum Permitted Vessel Speed, Military Practice Area, Mooring Area, Mooring Buoy, Mooring Trot, Notice Mark, Obstruction, Offshore Platform, Offshore Production Area, Oil Barrier, Physical AIS Aid to Navigation, Pile, Pilot Boarding Place, Pilotage District, Pipeline Overhead, Pipeline Submarine/On Land, Pontoon, Port Area, Precautionary Area, reduction/Storage Area, Pylon/Bridge Support, Radar Line, Radar Range, Radar Station, Radar Transponder Beacon, Radio Calling-In Point, Radio Station, Railway, Recommended Route Centreline, Recommended Track, Refuse Dump, Rescue Station, Restricted Area, River, Road, Runway, Safe Water Beacon, Safe Water Buoy, Sea Area/Named Water Area, Seabed Area, Seagrass, Seaplane Landing Area, Sensor, Shoreline Construction, Signal Station Traffic, Signal Station Warning, Silo/Tank, Slope Topline, Sloping Ground, Small Craft Facility, Sounding, Span Fixed, Span Opening, Special Purpose/General Beacon, Special Purpose/General Buoy, Structure Over Navigable Water, Submarine Pipeline Area, Terminal, Tidal Stream Panel Data, Tidal Stream – Flood/Ebb, Tideway, Traffic Separation Scheme, Tunnel, Turning Basin, Two-Way Route, Underwater/Awash Rock, Vegetation, Vehicle Transfer, Vessel Traffic Service Area, Water Turbulence, Waterway Area, Waterway Axis, Waterway Gauge, Waterway Profile, Weed/Kelp, Wind Turbine, Wreck	0,1
Association	The Cartographic Text	Text Placement	0,2

25.14 Traffic Separation Scheme aggregation

IHO Definition: **TRAFFIC SEPARATION SCHEME AGGREGATION.** A feature association for the binding between a Traffic Separation Scheme or a Traffic Separation Scheme System and its component features.

Remarks:

A **Traffic Separation Scheme Aggregation** must, if required, include one of any of the features shown in the “The Component” role below in upright text associated to a **Traffic Separation Scheme** feature.

- The **Traffic Separation Scheme** may additionally be associated to the aids to navigation marking the components of the Scheme using the association **Aids to Navigation Association** (see clause 25.2).

Role Type	Role	Associated With	Multiplicity
Aggregation	The Collection	Traffic Separation Scheme	0,1
Association	The Component	Inshore Traffic Zone, Precautionary Area, Restricted Area, Separation Zone or Line, Traffic Separation Scheme, Traffic Separation Scheme Boundary, Traffic Separation Scheme Crossing, Traffic Separation Scheme Lane Part, Two-Way Route, Two-Way Route Part	0,*

25.15 Two-way route aggregation

IHO Definition: **TWO-WAY ROUTE AGGREGATION.** A feature association for the binding between a two-way route and its component features.

Remarks:

- A **Two-Way Route Aggregation** must, if required, include at least one **Two-Way Route Part** feature associated to a **Two-Way Route** feature.
- The **Two-Way Route** may additionally be associated to the aids to navigation marking the components of the Route using the association **Aids to Navigation Association** (see clause 25.2).

Role Type	Role	Associated With	Multiplicity
Aggregation	The Collection	Two-Way Route	0,1
Association	The Component	Two-Way Route Part	0,*

25.16 Update aggregation

IHO Definition: **UPDATE AGGREGATION.** A feature association for the binding between an Update Information feature and its component Update Information features.

Remarks:

- An **Update Aggregation** must, if required, include at least two **Update Information** features associated to an **Update Information** feature having attribute **update type** = 3 (modify). See clause 3.12.

Role Type	Role	Associated With	Multiplicity
Aggregation	The Collection	Update Information	0,1
Association	The Component	Update Information	0,*

25.17 Updated information

IHO Definition: **UPDATED INFORMATION.** A feature association for the binding between an update information metadata feature and updated feature(s) that it identifies.

Remarks:

- An **Updated Information** association must, if required, include at least one of any of the features shown in the “The Updated Object” role below associated to an **Update Information** feature.

Role Type	Role	Associated With	Multiplicity
Association	The Update	Update Information	0,1
Association	The Updated Object	Administration Area, Airport/Airfield, Anchor Berth, Anchorage Area, Berth, Bollard, Bridge, Building, Built-Up Area, Bunker Station, Cable Area, Cable Overhead, Cable Submarine, Canal, Cardinal Beacon, Cardinal Buoy, Cargo Transhipment Area, Causeway, Caution Area, Checkpoint, Coast Guard Station, Coastline, Collision Regulations Limit, Communication Area, Conveyor, Crane, Current – Non-Gravitational, Custom Zone, Dam, Daymark, Depth Area, Depth Contour, Distance Mark, Dock Area, Dolphin, Dredged Area, Dry Dock, Dumping Ground, Dyke, Emergency Wreck Marking Buoy, Exceptional Navigation Structure, Fairway, Fairway System, Fence/Wall, Ferry Route, Fishery Zone, Fishing Facility, Floating Dock, Fog Signal, Fortified Structure, Foul Ground, Free Port Area, Gate, Gridiron, Harbour Area (Administrative), Harbour Basin, Harbour Facility, Helipad, Hulk, Information Area, Inshore Traffic Zone, Installation Buoy, Isolated Danger Beacon, Isolated Danger Buoy, Lake, Land Area, Land Elevation, Land Region, Landmark, Lateral Beacon, Lateral Buoy, Light Air Obstruction, Light All Around, Light Sectored, Local Direction Of Buoyage, Lock Basin, Lock Basin Part, Magnetic Variation, Marine Farm/Culture, Maximum Permitted Ship Dimensions, Maximum Permitted Vessel Speed, Military Practice Area, Mooring Area, Mooring Buoy, Mooring Trot, Navigation Line, Navigational System Of Marks, Notice Mark, Obstruction, Offshore Platform, Offshore Production Area, Oil Barrier, Physical AIS Aid to Navigation, Pile, Pilot Boarding Place, Pilotage District, Pipeline Overhead, Pipeline Submarine/On Land, Pontoon, Port Area, Precautionary Area, Production/Storage Area, Pylon/Bridge Support, Quality Of Bathymetric Data, Quality Of Non-Bathymetric Data, Quality Of Survey, Radar Line, Radar Range, Radar Reflector, Radar Station, Radar Transponder Beacon, Radio Calling-In Point, Radio Station, Railway, Recommended Route Centreline, Recommended Track, Recommended Traffic Lane Part, Refuse Dump, Rescue Station, Restricted Area, River, Road, Runway, Safe Water Beacon, Safe Water Buoy, Sandwave, Sea Area/Named Water Area, Seabed Area, Seagrass, Seaplane Landing Area, Sensor, Separation Zone or Line, Shoreline Construction, Signal Station Traffic, Signal Station Warning, Silo/Tank, Small Craft Facility, Slope Topline, Sloping Ground, Sounding, Sounding Datum, Span Fixed, Span Opening, Special Purpose/General Beacon, Special Purpose/General Buoy, Straight Territorial Sea Baseline, Structure Over Navigable Water, Submarine Pipeline Area, Terminal, Tidal Stream Panel Data, Tidal Stream – Flood/Ebb, Tideway, Traffic Separation Scheme, Traffic Separation Scheme Boundary, Traffic Separation Scheme Crossing, Traffic Separation Scheme Lane Part, Tunnel, Turning Basin, Two-Way Route, Two-Way Route Part, Underwater/Awash Rock, Unsurveyed Area, Update Information, Vegetation, Vehicle Transfer, Vertical Datum Of Data, Vessel Traffic Service Area, Water Turbulence, Waterway Area, Waterway Axis, Waterway Gauge, Waterway Profile, Weed/Kelp, Wind Turbine, Wreck	0,*

25.18 Anchorage or berth aggregation

IHO Definition: **ANCHORAGE OR BERTH AGGREGATION.** A feature association for the binding between an anchorage area, anchor berth or berth and the related features, e.g. notice marks, mooring facilities and bollards.

Remarks:

- If an Anchor Berth, Berth or Mooring Area is used as the Collection, it cannot be the Component at the same time.

Role Type	Role	Associated With	Multiplicity
Aggregation	The Collection	Anchorage Area, Anchor Berth, Berth, Mooring Area	1,*
Association	The Component	Anchor Berth, Berth, Bollard, Bunker Station, Communication Area, Mooring Area, Mooring Buoy, Notice Mark, Pile, Refuse Dump, Restricted Area, Shoreline Construction, Terminal, Vehicle Transfer	1,*

25.19 Barrage association

IHO Definition: **BARRAGE ASSOCIATION.** A feature association for the binding between a barrage and its elements.

Remarks:

- .

Role Type	Role	Associated With	Multiplicity
Aggregation	The Collection	Dam	1,1
Association	The Component	Cable Overhead, Cardinal Buoy, Communication Area, Gate, Lateral Buoy, Lock Basin, Lock Basin Part, Notice Mark, Pipeline Overhead, Radio Calling-In Point, Restricted Area, Shoreline Construction, Signal Station Traffic, Signal Station Warning, Special Purpose/General Buoy, Two Way Route Part, Waterway Gauge	1,*

25.20 Bridge arch association

IHO Definition: **BRIDGE ARCH ASSOCIATION.** A feature association for the binding between the individual **Span Fixed** features of a bridge arch.

Remarks:

- A **Bridge Arch Association** must include at least two **Span Fixed** features.
- If a bridge consists of several bridge arches a **Bridge Arch Association** has to be created for each of the arches.
- All the elements of a bridge have to be associated by a **Bridge Aggregation**.

Role Type	Role	Associated With	Multiplicity

Aggregation	The Collection	Span Fixed	1,1
Association	The Component	Span Fixed	1,*

25.21 Depth and clearance indicator association

IHO Definition: **DEPTH AND CLEARANCE INDICATOR ASSOCIATION.** A feature association for the binding between a Waterway Gauge and the related depth indicators or vertical clearance indicators or between several indicators.

Remarks:

- .

Role Type	Role	Associated With	Multiplicity
Aggregation	The Collection	Signal Station Warning, Waterway Gauge	1,1
Association	The Component	Signal Station Warning	1,*

25.22 Exceptional Navigation Structure aggregation

IHO Definition: **EXCEPTIONAL NAVIGATION STRUCTURE AGGREGATION.** A feature association for the binding between the exceptional navigation structure itself and the gates, signal stations, waiting berths and other features.

Role Type	Role	Associated With	Multiplicity
Aggregation	The Collection	Exceptional navigation structure	1,*
Association	The Component	Berth, Bollard, Communication Area, Dam, Depth Area, Gate, Lock Basin, Lock Basin Part, Notice Marks, Signal Station Traffic, Signal Station Warning, Shoreline Construction, Waterway Gauge,	1,*

25.23 Lock aggregation

IHO Definition: **LOCK AGGREGATION.** A feature association for the binding between the lock and the lock basins, lock basin parts, lock gates, signal stations, waiting berths and other features.

Role Type	Role	Associated With	Multiplicity
Aggregation	The Collection	Lock Basin	1,*

Association	The Component	Berth, Bridge, Bollard, Cable Overhead, Cardinal Buoy, Communication Area, Dam, Gate, Lock Basin, Lock Basin Part, Notice Marks, Pipeline Overhead, Radio Calling-In Point, Restricted Area, Signal Station Traffic, Signal Station Warning, Shoreline Construction, Span Fixed, Span Opening, Special Purpose/General Buoy, Two-Way Route Part, Waterway Gauge,	1,*
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25.24 Notice mark aggregation

IHO Definition: **NOTICE MARK AGGREGATION.** A feature association for the binding between notice marks and the features that they define.

Remarks:

- The features comprising a **Notice Mark Aggregation** must, if required, include at least one of any of the features included in the “The Component” role associated to one or more of the corresponding features in the “The Collection” role.
- In this case the name of the association is not pointing to the container, but to the containee. This allows to use one association for different types of infrastructure elements.

Role Type	Role	Associated With	Multiplicity
Aggregation	The Collection	Caution Area, Communication Area, Pylon/Bridge Support, Radio Calling-In Point, Restricted Area, Structure over Navigable Water, Turning Basin, Vehicle Transfer	1,*
Association	The Component	Notice Mark	1,*

25.25 Overhead cable aggregation

IHO Definition: **OVERHEAD CABLE AGGREGATION.** A feature association for the binding between a cable overhead and the associated pylons, notice marks, waterway gauges.

Role Type	Role	Associated With	Multiplicity
Aggregation	The Collection	Cable Overhead	1,*
Association	The Component	Notice Mark, Pylon/Bridge Support, Radar Reflector, Shoreline Construction, Waterway Gauge	1,*

25.26 Overhead pipeline aggregation

IHO Definition: **OVERHEAD PIPELINE AGGREGATION.** A feature association for the binding between a pipeline overhead and the associated pylons, notice marks, waterway gauges.

Role Type	Role	Associated With	Multiplicity
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Aggregation	The Collection	Pipeline Overhead	1,*
Association	The Component	Notice Mark, Pylon/Bridge Support, Radar Reflector, Shoreline Construction, Waterway Gauge	1,*

25.27 Signal station aggregation

IHO Definition: **SIGNAL STATION AGGREGATION.** A feature association for the binding between traffic and warning signal stations and the features to which they are related.

Remarks:

- The features comprising a **Signal Station Aggregation** must, if required, include at least one of any of the features included in the “The Component” role associated to one or more of the corresponding features in the “The Collection” role.
- In this case the name of the association is not pointing to the container, but to the containee. This allows to use one association for different types of infrastructure elements.

Role Type	Role	Associated With	Multiplicity
Aggregation	The Collection	Bunker Station, Harbour Basin, Terminal	1,*
Association	The Component	Signal Station Traffic, Signal Station Warning	1,*

25.28 Tunnel aggregation

IHO Definition: **TUNNEL AGGREGATION.** A feature association for the binding between a tunnel with a waterway in it and the associated objects, e.g. Communication Area, Notice Mark, Restricted Area, fender, Vertical clearance indicator, depth indicator, traffic signal station, warning signal station, radio calling-in point, overhead cable, overhead pipeline, waterway gauge.

Remarks:

-

Role Type	Role	Associated With	Multiplicity
Aggregation	The Collection	Tunnel	1,*
Association	The Component	Cable Overhead, Communication Area, Notice Mark, Pipeline Overhead, Radio Calling-In Point, Restricted Area, Shoreline Construction, Signal Station Traffic, Signal Station Warning, Two-Way Route Part, Waterway Gauge	1,*

26 Association Roles

26.1 The auxiliary feature

IHO Definition: THE AUXILIARY FEATURE. A pointer to a feature to which incidental, secondary or supplementary features are related to the referenced feature.

26.2 The cartographic text

IHO Definition: THE CARTOGRAPHIC TEXT. A pointer to a specific cartographically positioned location for text.

26.3 The collection

IHO Definition: THE COLLECTION. A pointer to the aggregate in a whole-part relationship.

26.4 The component

IHO Definition: THE COMPONENT. A pointer to a part in a whole-part relationship.

26.5 The equipment

IHO Definition: THE EQUIPMENT. A pointer to the feature(s) supported by a structure feature.

26.6 The information

IHO Definition: THE INFORMATION. A pointer to incidental, secondary or supplementary features related to an object that provides more information about the referenced feature or information type.

26.7 The position provider

IHO Definition: THE POSITION PROVIDER. A pointer to a specific feature(s).

26.8 The primary feature

IHO Definition: THE PRIMARY FEATURE. A pointer to the equipment a feature(s) supported by a structure feature to which incidental, secondary or supplementary features are related.

26.9 The quality information

IHO Definition: THE QUALITY INFORMATION. A pointer to a feature that describes changes made to a datasetan information type providing spatial quality information.

26.10 The roofed structure

IHO Definition: **THE ROOFED STRUCTURE.** A pointer to a supported roofed structure.

26.11 The structure

IHO Definition: **THE STRUCTURE.** A pointer to the feature that equipment feature(s) are supported by.

26.12 The support

IHO Definition: **THE SUPPORT.** A pointer to the feature(s) that support a structure.

26.13 The update

IHO Definition: **THE UPDATE.** A pointer to a feature that describes changes made to a dataset.

26.14 The updated object

IHO Definition: **THE UPDATED OBJECT.** A pointer to a feature that has been updated.

27 Geo Feature Attribute and Enumerate Descriptions

27.1 additional mark (addmrk)

IHO Definition: Shape and position of an additional board on a notice mark.

1) Top (Board)

IHO Definition: A rectangular board at the top of the main sign.

2) Bottom (Board)

IHO Definition: A rectangular board at the bottom of the main sign.

3) Right (Triangle to the Right)

IHO Definition: A triangular board at the right side of the main sign.

4) Left (Triangle to the Left)

IHO Definition: A triangular board at the left side of the main sign.

5) Bottom (Triangle to the Bottom)

IHO Definition: A triangular board at the bottom of the main sign.

Remarks:

The kind and location of an additional mark at a notice mark.

27.2 administrative division

IHO Definition: **ADMINISTRATIVE DIVISION.** A generic term for an administrative region within a country at a level below that of the sovereign state.

Attribute Type: Text

Remarks:

- The attribute **administrative division** should contain no more than 100 characters.

27.3 allowed consumption (allcon)

IHO Definition: The maximum allowed power that may be used by the vessel

Attribute Type: Real

Unit: kilowatt-hour, kWh

Precision: 1kWh

Minimum value: 0

Example: 2000 for an allowed consumption of 2000 kWh

Remarks:

No remarks.

27.4 amount of amperage (amoamp)

IHO Definition: The maximum electric amperage possible.

Attribute Type: Real

Unit: Ampere, A

Precision: 1A

Minimum value: 0

Example: 200 for 200 A

Remarks:

No remarks.

27.5 assemblies of ship (excluding) (lc_ase)

IHO Definition: Excluding list of assemblies of ships for the applicability of a feature.

1) All Types

IHO Definition: The sum of all of the different kinds (or sorts or types) of an entity.

2) Other

IHO Definition: Being the one or ones distinct from that or those first mentioned or implied.

3) Single Vessel

IHO Definition: A single vessel (no assembly or formation).

5) Convoy

IHO Definition: A rigid or **towed convoy** of craft.

6) Formation

IHO Definition: The manner in which a convoy is assembled.

7) Rigid Convoy

IHO Definition: A **pushed convoy** or **breasted up formation**.

8) Pushed Convoy

IHO Definition: A rigid assembly of craft of which at least one is positioned in front of the craft providing the power for propelling the convoy, known as the "pusher(s)"; a convoy composed of a pusher craft and a pushed craft coupled so as to permit guided articulation is also considered as rigid.

9) Breasted Up Formation

IHO Definition: An assembly of craft coupled rigidly side by side, none of which is positioned in front of the craft propelling the assembly.

10) Towed Convoy

IHO Definition: An assembly of one or more craft, floating establishments or floating installations towed by one or more self-propelled craft forming part of the convoy.

Remarks:

No remarks.

27.6 assemblies of ship (including) (lc_asi)

IHO Definition: Including list of assemblies of ships for the applicability of a feature.

1) All Types

IHO Definition: The sum of all of the different kinds (or sorts or types) of an entity.

2) Other

IHO Definition: Being the one or ones distinct from that or those first mentioned or implied.

3) Single Vessel

IHO Definition: A single vessel (no assembly or **formation**).

5) Convoy

IHO Definition: A rigid or **towed convoy** of craft.

6) Formation

IHO Definition: The manner in which a convoy is assembled.

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9) Breasted Up Formation

IHO Definition: An assembly of craft coupled rigidly side by side, none of which is positioned in front of the craft propelling the assembly.

10) Towed Convoy

IHO Definition: An assembly of one or more craft, floating establishments or floating installations towed by one or more self-propelled craft forming part of the convoy.

Remarks:

No remarks.

27.7 average passing time reference (aptref)

IHO Definition: The string encodes the file name of an external file.

Remarks:

No remarks.

27.8 bank of the waterway (bnkwtw)

IHO Definition: Bank of the river (waterway).

1) Left

IHO Definition: Of, relating to, or located on or near the side of a person or thing that is turned toward the west when the subject is facing north (opposed to **right**).

2) Right

IHO Definition: Of, relating to, or located on or near the side of a person or thing that is turned toward the east when the subject is facing north (opposed to left).

Remarks:

No remarks.

27.9 based on fixed marks (CATTRK)

IHO Definition: **BASED ON FIXED MARKS.** A straight route (known as a recommended track, range or leading line), which comprises:

- a. at least two structures (usually beacons or daymarks) and/or natural features, which may carry lights and/or top-marks. The structures/features are positioned so that when observed to be in line, a vessel can follow a known bearing with safety. (Adapted from International Association of Lighthouse Authorities – IALA Aids to Navigation Guide, 1990); or
- b. a single structure or natural feature, which may carry lights and/or a topmark, and a specified bearing which can be followed with safety. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.72, November 2000, as amended).

Attribute Type: Boolean

Indication: A True value is an indication that the track is based on a system of one or more fixed marks.

Remarks:

No remarks.

27.10 beacon shape (BCNSHP)

IHO Definition: **BEACON SHAPE.** Describes the characteristic geometric form of the beacon. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

Attribute Type: Enumeration

1) **stake, pole, perch, post**

IHO Definition: An elongated wood or metal pole, driven into the ground or seabed, which serves as a navigational aid or a support for a navigational aid. (Adapted from IHO Dictionary – S-32).

2) **withy**

IHO Definition: A tree without roots stuck or spoiled into the bottom of the sea to serve as a navigational aid. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.5, November 2000).

3) **beacon tower**

IHO Definition: A solid structure of the order of 10 metres in height used as a navigational aid. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.5, November 2000).

4) **lattice beacon**

IHO Definition: A structure consisting of strips of metal or wood crossed or interlaced to form a structure to serve as an aid to navigation or as a support for an aid to navigation. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.5, November 2000).

5) **pile beacon**

IHO Definition: A long heavy timber(s) or section(s) of steel, wood, concrete, etc., forced into the seabed to serve as an aid to navigation or as a support for an aid to navigation. (Adapted from IHO Dictionary – S-32 and Navigation Dictionary, US National Oceanic and Atmospheric Administration – NOAA, 1969).

6) **cairn**

IHO Definition: A mound of stones, usually conical or pyramidal, raised as a landmark or to designate a point of importance in surveying. (IHO Dictionary – S-32).

7) **buoyant beacon**

IHO Definition: A tall spar-like beacon fitted with a permanently submerged buoyancy chamber, the lower end of the body is secured to seabed sinker either by a flexible joint or by a cable under tension. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.5, November 2000).

Remarks:

No remarks.

27.11 bridge construction (**CATBRG**)

IHO Definition: **BRIDGE CONSTRUCTION.** The bridge's primary shape and/or construction material.

Attribute Type: Enumeration

1) **arch**

IHO Definition: A typically curved structural member spanning an opening and serving as a support (as for the wall or other weight above the opening). (Merriam-Webster On-line Dictionary, July 2023).

2) **viaduct**

IHO Definition: A structure consisting of a series of arches or towers supporting a roadway, waterway, etc., across a depression, etc. (IHO Dictionary – S-32).

3) **pontoon bridge**

IHO Definition: A fixed floating bridge supported by pontoons. (McGraw-Hill Dictionary of Scientific and Technical Terms, 3rd Edition, 1984).

4) **suspension bridge**

IHO Definition: A fixed bridge consisting of either a roadway or a truss suspended from two or more cables which pass over towers and are anchored by backstays to a firm foundation. (McGraw-Hill Encyclopaedia of Science and Technology, 7th Edition, 1992).

5) **transporter bridge**

IHO Definition: Consists of towers on each side of the watercourse connected by a system of girders on which a carriage runs. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

Remarks:

No remarks.

27.12 bridge function (**CATBRG**)

IHO Definition: **BRIDGE FUNCTION.** A specific role that describes the purpose of a bridge.

Attribute Type: Enumeration

1) **vehicular**

IHO Definition: Of, relating to, or designed for vehicles and especially motor vehicles. (Merriam-Webster On-line Dictionary, July 2023).

2) **rail**

IHO Definition: Of, relating to, or designed for vehicles that run on a guiding track(s), especially trains.

3) **pedestrian**

IHO Definition: Of, relating to, or designed for walking. (Merriam-Webster On-line Dictionary, July 2023).

4) aqueduct

IHO Definition: A bridge supporting an artificially elevated channel, for the conveyance of water. (Adapted from The New Shorter Oxford English Dictionary, 1993).

Remarks:

No remarks.

27.13 building shape (BUISHP)

IHO Definition: **BUILDING SHAPE.** The specific shape of the building.

Attribute Type: Enumeration

5) high-rise building

IHO Definition: A building having many storeys. (The New Shorter Oxford English Dictionary, 1993).

6) pyramid

IHO Definition: A polyhedron of which one face is a polygon of any number of sides, and the other faces are triangles with a common vertex. (The New Shorter Oxford English Dictionary, 1993).

7) cylindrical

IHO Definition: Shaped like a cylinder, which is a solid geometrical figure generated by straight lines fixed in direction and describing with one of its points a closed curve, especially a circle. (The New Shorter Oxford English Dictionary, 1993).

8) spherical

IHO Definition: Shaped like a sphere, which is a body the surface of which is at all points equidistant from the centre. (The New Shorter Oxford English Dictionary, 1993).

9) cubic

IHO Definition: A shape the sides of which are six equal squares; a regular hexahedron. (The New Shorter Oxford English Dictionary, 1993).

Remarks:

No remarks.

27.14 bunker vessel, availability (bunves)

IHO Definition: Indication of the availability of a bunker vessel.

1) Bunker Vessel Available

IHO Definition: A bunker vessel is available.

2) No Bunker Vessel Available

IHO Definition: A bunker vessel is not available.

Remarks:

No remarks.

27.15 buoy shape (BOYSHP)

IHO Definition: **BUOY SHAPE.** The principal shape and/or design of a buoy. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

Attribute Type: Enumeration1) **conical**

IHO Definition: The upper part of the body above the water-line, or the greater part of the superstructure, has approximately the shape or the appearance of a pointed cone with the point upwards. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.7, November 2000).

2) **can**

IHO Definition: The upper part of the body above the water-line, or the greater part of the superstructure, has the shape of a cylinder, or a truncated cone that approximates to a cylinder, with a flat end uppermost. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.7, November 2000).

3) **spherical**

IHO Definition: Shaped like a sphere, which is a body the surface of which is at all points equidistant from the centre. (The New Shorter Oxford English Dictionary, 1993).

4) **pillar**

IHO Definition: The upper part of the body above the water-line, or the greater part of the superstructure is a narrow vertical structure, pillar or lattice tower. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.7, November 2000).

5) **spar**

IHO Definition: The upper part of the body above the water-line, or the greater part of the superstructure, has the form of a pole, or of a very long cylinder, floating upright. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.7, November 2000).

6) **barrel**

IHO Definition: The upper part of the body above the water-line, or the greater part of the superstructure, has the form of a barrel or cylinder floating horizontally. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.7, November 2000).

7) **superbuoy**

IHO Definition: A very large buoy designed to carry a signal light of high luminous intensity at a high elevation. (IHO Dictionary – S-32).

8) **ice buoy**

IHO Definition: A specially constructed shuttle shaped buoy which is used in ice conditions. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.7, November 2000).

Remarks:

- The principal shapes are those recommended in the International Association of Lighthouse Authorities – IALA System.

27.16 buried depth (BURDEP)

IHO Definition: **BURIED DEPTH.** The depth below the seabed to which an object is buried. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.8, November 2000).

Attribute Type: Real

Unit: Defined as an attribute in the IENC dataset metadata: metre (m)

Precision: 0·1m

Minimum range: 0

Maximum range: 20

Range closure: Left half-open interval *(minimum < buried depth ≤ maximum)*

Example: 2.5 for a depth of 2·5 metres

Remarks:
No remarks.

27.17 call sign (CALSGN)

IHO Definition: **CALL SIGN.** The designated call-sign of a station (radio station, radar station, pilot, ...). (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.9, November 2000 (as amended)).

Attribute Type: Text

Remarks:

- The attribute **call sign** should contain no more than 150 characters.

27.18 category of airport/airfield (CATAIR)

IHO Definition: **CATEGORY OF AIRPORT/AIRFIELD.** Classification of airport/airfield based on the primary aircraft and user group.

Attribute Type: Enumeration

1) **military aeroplane airport**

IHO Definition: A large military airfield usually equipped with a control tower, hangars and accommodation for the receiving and discharging of passengers or cargo. (Adapted from The Macquarie Dictionary, 1988).

2) **civil aeroplane airport**

IHO Definition: A large airfield usually equipped with a control tower, hangars and accommodation for the receiving and discharging of passengers or cargo. (The Macquarie Dictionary, 1988).

3) **military heliport**

IHO Definition: A landing place for helicopters controlled by the military. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.10, November 2000).

4) **civil heliport**

IHO Definition: A landing place for helicopters, often the roof of a building. (The Macquarie Dictionary, 1988).

5) **glider airfield**

IHO Definition: An area of land set aside for the take-off and landing of gliders. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.10, November 2000).

6) **small planes airfield**

IHO Definition: An area of land set aside for the take-off and landing of small aeroplanes. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.10, November 2000).

8) **emergency airfield**

IHO Definition: An area of land set aside for the take-off and landing of aeroplanes or helicopters in times of emergency. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.10, November 2000).

9) **search and rescue airfield**

IHO Definition: An area of land set aside for the take-off and landing of aeroplanes or helicopters in times of search and rescue.

Remarks:
No remarks.

27.19 category of anchorage (CATACH)

IHO Definition: **CATEGORY OF ANCHORAGE.** Classification of an area where different use types of vessel can remain static.

Attribute Type: Enumeration

1) unrestricted anchorage

IHO Definition: An area in which vessels anchor or may anchor. (IHO Dictionary – S-32).

2) deep water anchorage

IHO Definition: An area in which vessels of deep draught anchor or may anchor. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.11, November 2000).

3) tanker anchorage

IHO Definition: An area in which tankers anchor or may anchor. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.11, November 2000).

4) explosives anchorage

IHO Definition: An area set apart for anchored ships discharging or receiving explosives.

5) quarantine anchorage

IHO Definition: An area where a vessel anchors when satisfying quarantine regulations. (IHO Dictionary – S-32).

6) seaplane anchorage

IHO Definition: An area in which seaplanes anchor or may anchor. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.11, November 2000).

7) small craft anchorage

IHO Definition: An area in which yachts and small boats anchor or may anchor. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.11, November 2000).

9) anchorage for periods up to 24 hours

IHO Definition: An area in which vessels anchor or may anchor for periods of up to 24 hours. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.11, November 2000).

10) anchorage for a limited period of time

IHO Definition: An area in which vessels may anchor for a period of time not to exceed a specific limit. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.11, November 2000).

11) anchorage for other vessels than pushing navigation vessels

IHO Definition: An area where other vessels than pushing-navigation vessels may anchor.

12) anchorage for dry cargo vessels

IHO definition: An area where dry cargo vessels may anchor.

13) anchorage for rafts

IHO definition: An area where rafts may anchor.

14) waiting anchorage

IHO Definition: An area in which vessels anchor or may anchor while waiting, for example, for access to a port or berth.

15) reported anchorage

IHO Definition: A location not defined by a regulatory authority that has been reported to be suitable and safe for anchoring.

16) anchorage for pushing navigation vessels

IHO definition: An area where pushing-navigation vessels may anchor.

Remarks:

No remarks.

27.20 category of authority

IHO Definition: The type of person, government agency or organisation granted powers of managing or controlling access to and/or activity in an area.

2) Border Control

IHO Definition: The administration to prevent or detect and prosecute violations of rules and regulations at international boundaries.

3) Police

IHO Definition: The department of government, or civil force, charged with maintaining public order.

4) Port

IHO Definition: 1) Person or corporation, owners of, or entrusted with or invested with the power of managing a port. May be called a Harbour Board, Port Trust, Port Commission, Harbour Commission, Marine Department.
2) For port and near shore operations.

5) Immigration

IHO Definition: The authority controlling people entering a country.

6) Health

IHO Definition: The authority with responsibility for checking the validity of the health declaration of a vessel and for declaring free pratique.

7) Coast Guard

IHO Definition: Organization keeping watch on shipping and coastal waters according to governmental law; normally the authority with responsibility for search and rescue.

8) Agricultural

IHO Definition: The authority with responsibility for preventing infection of the agriculture of a country and for the protection of the agricultural interests of a country.

9) Military

IHO Definition: A military authority which provides control of access to or approval for transit through designated areas or airspace.

10) Private Company

IHO Definition: A private or publicly owned company or commercial enterprise which exercises control of facilities, for example a calibration area.

11) Maritime Police

IHO Definition: A governmental or military force with jurisdiction in territorial waters. Examples could include Gendarmerie Maritime, Carabinerie, and Guardia Civil.

12) Environmental

IHO Definition: An authority with responsibility for the protection of the environment.

13) Fishery

IHO Definition: An authority with responsibility for the control of fisheries.

14) Finance

IHO Definition: An authority with responsibility for the control and movement of money.

15) Maritime

IHO Definition: A national or regional authority charged with administration of maritime affairs.

16) Customs

IHO Definition: The agency or establishment for collecting duties, tolls.

Remarks:

No remarks.

27.21 category of built-up area (CATBUA)

IHO Definition: CATEGORY OF BUILT-UP AREA. Human settlement classification.

Attribute Type: Enumeration

1) **urban area**

IHO Definition: An area predominantly occupied by man-made structures used for residential, commercial, and industrial purposes. (Nautical Chart Manual, US Department of Commerce, 1992).

2) **settlement**

IHO Definition: A continuously occupied concentration of tents or lightweight fixed structures (for example: huts) serving as residences. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

3) **village**

IHO Definition: A self-contained group of houses and associated buildings, usually in a country area. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

4) **town**

IHO Definition: An inhabited place larger and more regularly built and with more complete and independent local government than a village but not incorporated as a city. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

5) **city**

IHO Definition: A major town inhabited by a large permanent community with all essential services. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

6) **holiday village**

IHO Definition: A complex for holiday-makers with cottages, shops, and entertainment, on site, which is mainly populated on a seasonal basis. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

Remarks:

No remarks.

27.22 category of bunker station (catbun)

IHO Definition: Category of bunker station.

1) **Diesel Oil**

IHO Definition: Diesel oil available.

2) **Water**

IHO Definition: A colourless, odourless, tasteless liquid that is a compound of hydrogen and oxygen.

3) **Ballast**

IHO Definition: Material carried by a ship to ensure its stability.

4) **Power**

IHO Definition: Power supply available.

5) **Compressed Hydrogen Bunkering**

IHO Definition: Transfer of compressed hydrogen to the fuel tanks of a ship.

6) **Liquefied Hydrogen Bunkering**

IHO Definition: Transfer of liquefied hydrogen to the fuel tanks of a ship.

7) Methanol Bunkering

IHO Definition: Transfer of methanol to the fuel tanks of a ship.

8) Ammonia Bunkering

IHO Definition: Transfer of ammonia to the fuel tanks of a ship.

Remarks:

No remarks.

27.23 category of cable (CATCBL)

IHO Definition: **CATEGORY OF CABLE**. Classification of the cable based on the services provided.

Attribute Type: Enumeration

1) **power line**

IHO Definition: A cable that transmits or distributes electrical power. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

3) **transmission line**

IHO Definition: Multiple un-insulated cables usually supported by steel lattice towers. Such features are generally more prominent than normal power lines. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.16, November 2000).

4) **telephone**

IHO Definition: A cable that transmits telephone signals.

5) **telegraph**

IHO Definition: An apparatus, system or process for communication at a distance by electric transmission over wire.

6) **mooring cable**

IHO Definition: A chain or very strong fibre or wire rope used to anchor or moor vessels or buoys. (IHO Dictionary – S-32).

7) **ferry**

IHO Definition: A vessel for transporting passengers, vehicles, and/or goods across a stretch of water, especially as a regular service. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2016).

A ferry cable is a cable or chain used to facilitate the movement of a ferry.

8) **fibre optic cable**

IHO Definition: A cable made of glass or plastic fibre designed to guide light along its length, fibre optic cables are widely used in fibre-optic communication, which permits transmission over longer distances and at higher data rates than other forms of communication.

9) **junction cable**

IHO Definition: A cable used for joining components of complex marine structures, for example mooring trot.

10) **telecommunications cable**

IHO Definition: A cable used for the transmission and reception of modulated communication waves/signals. (Adapted from Wikipedia).

Remarks:

No remarks.

27.24 category of canal (CATCAN)

IHO Definition: **CATEGORY OF CANAL.** Classification of an artificial waterway used for travel, drainage, or irrigation.

Attribute Type: Enumeration

1) **transportation**

IHO Definition: A canal used for navigation as part of a transport system. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.17, November 2000).

2) **drainage**

IHO Definition: A canal used to drain excess water from surrounding land. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.17, November 2000).

3) **irrigation**

IHO Definition: A canal used to supply water for the purpose of irrigation. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.17, November 2000).

Remarks:

No remarks.

27.25 category of cardinal mark (CATCAM)

IHO Definition: **CATEGORY OF CARDINAL MARK.** The four quadrants (north, east, south and west) are bounded by the true bearings NW-NE, NE-SE, SE-SW and SW-NW taken from the point of interest.

A cardinal mark is named after the quadrant in which it is placed.

The name of the cardinal mark indicates that it should be passed to the named side of the mark. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.18, November 2000).

Attribute Type: Enumeration

1) **north cardinal mark**

IHO Definition: Quadrant bounded by the true bearing NW-NE taken from the point of interest; it should be passed to the north side of the mark. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.18, November 2000).

2) **east cardinal mark**

IHO Definition: Quadrant bounded by the true bearing NE-SE taken from the point of interest. It should be passed to the east side of the mark. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.18, November 2000).

3) **south cardinal mark**

IHO Definition: Quadrant bounded by the true bearing SE-SW taken from the point of interest; it should be passed to the south side of the mark. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.18, November 2000).

4) **west cardinal mark**

IHO Definition: Quadrant bounded by the true bearing SW-NW taken from the point of interest; it should be passed to the west side of the mark. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.18, November 2000).

Remarks:

- Cardinal marks do not have a distinctive shape but are normally pillar or spar. To conform to the IALA Maritime Buoyage System, they are always coloured in yellow and black horizontal bands and their distinctive double

cone top-marks are always black. Cardinal marks may also have a special system of flashing white lights and if such lights are fitted they are encoded as separate **Light** features.

27.26 category of cargo

IHO Definition: **CATEGORY OF CARGO**. Classification of the different types of cargo that a ship may be carrying. (IHO Nautical Information Provision Working Group, 2016).

Attribute Type: Enumeration

1) **bulk**

IHO Definition: Unpacked homogenous cargo poured loose in a certain space of a vessel, for example oil or grain. (Inland ENC Harmonization Group, Feature Catalogue Edition 2.4).

2) **container**

IHO Definition: One of a number of standard sized cargo carrying units, secured using standard corner attachments and bar. (IHO Nautical Information Provision Working Group, 2016).

3) **general**

IHO Definition: Break bulk cargo normally loaded by crane. (IHO Nautical Information Provision Working Group, 2016).

4) **liquid**

IHO Definition: Any cargo loaded by pipeline. (IHO Nautical Information Provision Working Group, 2016).

5) **passenger**

IHO Definition: A fee paying traveller. (IHO Nautical Information Provision Working Group, 2016).

6) **livestock**

IHO Definition: Live animals carried in bulk. (IHO Nautical Information Provision Working Group, 2016).

7) **dangerous or hazardous**

IHO Definition: Dangerous or hazardous cargo as described by the IMO International Maritime Dangerous Goods code. (IHO Nautical Information Provision Working Group, 2016).

8) **heavy lift**

IHO Definition: Indivisible heavy items of weight generally over 100 tons, and width or height greater than 100 metres. (Adapted from Wikipedia).

9) **ballast**

IHO Definition: Material carried by a ship to ensure its stability. (Adapted from Oxford English Dictionary).

10) **dry bulk cargo**

IHO Definition: Commodity cargo that is transported unpackaged in large quantities. These types of goods usually need to be kept dry during the whole transportation period. (Adapted from WÄRTSILÄ Encyclopedia of Marine and Energy Technology).

11) **liquid bulk cargo**

IHO Definition: Liquids or gases that are transported in bulk and carried unpackaged. (Adapted from Wikipedia).

12) **reefer container cargo**

IHO Definition: Cargo transported in refrigerated containers, generally perishable commodities which require temperature-controlled transportation, such as fruit, meat, fish, vegetables, dairy products and other foods. (Adapted from Wikipedia).

13) **Ro-Ro cargo**

IHO Definition: Wheeled cargo, such as cars, busses, trucks, agricultural vehicles and cranes, that are driven on and off the ship on their own wheels or using a platform vehicle, such as a self-propelled modular transporter. (Wikipedia).

14) **project cargo**

IHO Definition: Project cargo is a term used to broadly describe the national or international transportation of large, heavy, high value, or critical (to the project they are intended for) pieces of equipment. Also commonly referred to as heavy lift, this includes shipments made of various components which need disassembly for shipment and reassembly after delivery. (Wikipedia).

15) **break bulk cargo**

IHO Definition: Goods that are stowed on board ship in individually counted units, and not in intermodal containers nor in bulk as with oil or grain. (Adapted from Wikipedia).

Remarks:

- For **category of cargo (including)** (lc_cci) and **category of cargo (excluding)** (lc_cce) see 27.28 and 27.27

27.27 category of cargo (excluding) (lc_cce)

IHO Definition: Excluding list of categories of cargo for the applicability of a feature.

1) All Types

IHO Definition: The sum of all of the different kinds (or sorts or types) of an entity.

2) Other

IHO Definition: Being the one or ones distinct from that or those first mentioned or implied.

4) Bulk

IHO Definition: Unpacked homogenous cargo poured loose in a certain space of a vessel e.g. oil or grain.

5) Dry Cargo

IHO Definition: Goods, such as coal, metals, and grain, that are not liquid and are carried in large quantities by ship or in another large vehicle.

6) Liquid Cargo

IHO Definition: Commodities that are shipped in a liquefied state, by vessels designed to handle liquids.

7) Liquid Cargo (Type N)

IHO Definition: Commodities that are shipped in a liquefied state, by Type N vessels designed to handle liquids.

8) Liquid Cargo (Type C)

IHO Definition: Commodities that are shipped in a liquefied state, by Type C vessels designed to handle liquids.

9) Gas

IHO Definition: A substance with particles that can move freely, usually a fuel substance in the context of storage tanks.

Remarks:

No remarks.

27.28 category of cargo (including) (lc_cci)

IHO Definition: Including list of categories of cargo for the applicability of a feature.

1) All Types

IHO Definition: The sum of all of the different kinds (or sorts or types) of an entity.

2) Other

IHO Definition: Being the one or ones distinct from that or those first mentioned or implied.

4) Bulk

IHO Definition: Unpacked homogenous cargo poured loose in a certain space of a vessel e.g. oil or grain.

5) Dry Cargo

IHO Definition: Goods, such as coal, metals, and grain, that are not liquid and are carried in large quantities by ship or in another large vehicle.

6) Liquid Cargo

IHO Definition: Commodities that are shipped in a liquefied state, by vessels designed to handle liquids.

7) Liquid Cargo (Type N)

IHO Definition: Commodities that are shipped in a liquefied state, by Type N vessels designed to handle liquids.

8) Liquid Cargo (Type C)

IHO Definition: Commodities that are shipped in a liquefied state, by Type C vessels designed to handle liquids.

9) Gas

IHO Definition: A substance with particles that can move freely, usually a fuel substance in the context of storage tanks.

Remarks:

No remarks.

27.29 category of CEMT class (catccl)

IHO Definition: Category of CEMT class.

1) 0 Small Vessels and Pleasure Craft

IHO Definition: Designated for small vessels and pleasure crafts only.

2) I Peniche

IHO Definition: Designated for barges of type "Pniche" (west of river Elbe) or of type "Gross Finow" (east of river Elbe).

3) II Campine Barge

IHO Definition: Designated for barges of type "Kempenaar" (west of river Elbe) or of type "BM-500" (east of river Elbe).

4) III Dortmund-Ems Barge

IHO Definition: Designated for barges of type "Gustav Koenigs" (west of river Elbe) or of a similar type concerning the dimensions (east of river Elbe).

5) IV Rhine-Herne Barge

IHO Definition: Designated for barges of type "Johann Welker".

6) Va Large Rhine Barge; 1-Barge Push-Tow Unit

IHO Definition: Designated for barges of type "Large Rhine barge" or pushed convoys with one barge.

7) Vb 2-Barge Push-Tow Unit; Long Formation

IHO Definition: Designated for pushed convoys with two barges, long formation.

8) VIa 2-Barge Push-Tow Unit; Wide Formation

IHO Definition: Designated for pushed convoys with two barges, wide formation.

9) VIb 4-Barge Push-Tow Unit

IHO Definition: Designated for pushed convoys with four barges.

10) VIc 6-Barge Push-Tow Unit

IHO Definition: Designated for pushed convoys with six barges.

11) No CEMT Class

IHO Definition: A waterway having no classification for interoperability of large navigable waterways forming part of the Trans-European Inland Waterway network within Continental Europe and Russia.

12) VII 9-Barge Push-Tow Unit

IHO Definition: Designated for pushed convoys with nine barges.

Remarks:

No remarks.

27.30 category of checkpoint (CATCHP)

IHO Definition: **CATEGORY OF CHECKPOINT.** Classification of a place where vehicles or travellers are stopped for identification or inspection.

Attribute Type: Enumeration

1) custom

IHO Definition: Serves as a government checkpoint where customs duties are collected, the flow of goods are regulated and restrictions enforced, and shipments or vehicles are cleared for entering or leaving a country. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

2) border

IHO Definition: An office, at which immigration control takes place.

Remarks:

No remarks.

27.31 category of coastline (CATCOA)

IHO Definition: **CATEGORY OF COASTLINE.** Physical condition of the coastline.

Attribute Type: Enumeration

1) steep coast

IHO Definition: A coast backed by rock or earth cliffs, gives a good radar return and is useful for visual identification from a considerable distance off, where cliffs alternate with low lying coast along the shoreline. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.20, November 2000).

2) flat coast

IHO Definition: A level coast with no obvious topographic features. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.20, November 2000).

3) sandy shore

IHO Definition: A shoreline area made up of sand, that is, loose material consisting of small but easily distinguishable, separate grains, between 0.0625 and 2.000 millimetres in diameter.

4) stony shore

IHO Definition: A shoreline area made up of rock and rock fragments ranging in size from pebbles and gravel to boulders or large rock masses.

5) shingly shore

IHO Definition: A shoreline area made up of rounded, often flat waterworn rock fragments larger than approximately 16 millimetres.

6) glacier, seaward end

IHO Definition: Projecting seaward extension of glacier, usually afloat. (IHO Dictionary – S-32).

7) mangrove

IHO Definition: One of several genera of tropical trees or shrubs which produce many prop roots and grow along low-lying coasts into shallow water. (IHO Dictionary – S-32).

8) marshy shore

IHO Definition: A shoreline area made up of spongy land saturated with water. It may have a shallow covering of water, usually with a considerable amount of vegetation appearing above the surface. (Adapted from IHO Dictionary – S-32).

9) coral reef

IHO Definition: A reef, often of large extent, composed chiefly of coral and its derivatives.

10) ice coast

IHO Definition: A vertical cliff forming the seaward edge of an ice shelf, ranging in height from 2 metres to 50 metres or more above sea level. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.21, November 2000).

11) shelly shore

IHO Definition: A shoreline area made up of shells, that is, made up of the hard outside covering of marine animals.

Remarks:

No remarks.

27.32 category of communication (catcom)

IHO Definition: Category of communication.

1) VTS Centre

IHO Definition: The centre from which Vessel Traffic Services are operated. A VTS is a service implemented by a competent authority, designed to improve the safety and efficiency of vessel traffic and to protect the environment. The services should have the capability to interact with the traffic and to respond to traffic situations developing in the area.

2) VTS Sector

IHO Definition: The service area of a VTS centre.

3) IVS Point

IHO Definition: A reporting point of the "Informatie en Volgsysteem voor de Scheepvaart" in the Netherlands.

4) MIB

IHO Definition: A reporting point of the "Melde- und Informationssystem Binnenschifffahrt" in Germany.

5) Lock

IHO Definition: A signal station for the control of vessels entering or leaving a lock.

6) Bridge

IHO Definition: (1) An elevated structure extending across or over the weather deck of a vessel, or part of such a structure. The term is sometimes modified to indicate the intended use, such as navigating bridge or signal bridge. (2) A structure erected over a depression or an obstacle such as a body of water, railroad, etc., to provide a roadway for vehicles or pedestrians.

7) Custom

IHO Definition: Serves as a government checkpoint where customs duties are collected, the flow of goods are regulated and restrictions enforced, and shipments or vehicles are cleared for entering or leaving a country.

8) Harbour

IHO Definition: A reporting point of a harbour.

9) WLAN Area

IHO Definition: An area where free wireless network is available.

Remarks:

No remarks.

27.33 category of conveyor (CATCON)

IHO Definition: **CATEGORY OF CONVEYOR.** Classification of conveyor used for moving goods from one location to another.

Attribute Type: Enumeration

1) aerial cableway

IHO Definition: A transportation system consisting of load cables strung between pylons on which carrier units (for example: cars or buckets intended to transport people, material, and/or equipment) are suspended. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

2) belt conveyor

IHO Definition: A conveyor along which material or people are transported by means of a moving belt. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.23, November 2000).

3) flume

IHO Definition: An artificial channel, usually an inclined chute or trough, for carrying water to furnish power, transport logs down a mountainside, etc. (Websters New World Dictionary Third College Edition).

4) lift/elevator

IHO Definition: Any of various mechanical devices for raising objects or materials.

Remarks:

No remarks.

27.34 category of crane (CATCRN)

IHO Definition: **CATEGORY OF CRANE.** Classification of machines used for hoisting and moving heavy objects.

Attribute Type: Enumeration

2) container crane/gantry

IHO Definition: A high speed, shore-based crane used in the lift-on/lift-off operation of specially constructed containers. (Adapted from Nautical Chart Manual, US Department of Commerce, Coast and Geodetic Survey, 7th Edition).

3) **sheerlegs**

IHO Definition: A tripodal structure used in dockyards and harbours for stepping masts or lifting loads in to and out of vessels. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.25, November 2000).

4) **travelling crane**

IHO Definition: A crane mounted on rails (track) that can move (usually parallel to the wharf face) in order to load and unload cargo vessels. (Canadian Hydrographic Service).

5) **A-frame**

IHO Definition: A type of crane shaped like the letter “A”. (Canadian Hydrographic Service).

6) **goliath crane**

IHO Definition: A powerful travelling crane mounted on a movable gantry of large span. (Merriam-Webster Dictionary).

Remarks:

No remarks.

27.35 category of dam (CATDAM)

IHO Definition: **CATEGORY OF DAM.** Classification of a structure acting as barrier to water flow.

Attribute Type: Enumeration

1) **weir**

IHO Definition: A dam erected across a river to raise the level of the water. A fence of stakes set in a river or along the shore as a trap for fish. The word is now restricted to smaller works, the larger are called dams. (IHO Dictionary – S-32).

2) **dam**

IHO Definition: A barrier to check or confine anything in motion; particularly one constructed to hold back water and raise its level to form a reservoir, or to prevent flooding. (IHO Dictionary – S-32).

3) **flood barrage**

IHO Definition: An opening dam across a channel which, when required, is closed to control flood waters. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.26, November 2000).

Remarks:

No remarks.

27.36 category of distance mark (catdis)

IHO Definition: Classification of fixed and virtual distance marks.

1) **Distance Mark Not Physically Installed**

IHO Definition: A point at which a distance from an origin along a feature is given for information, but at which no specific marker exists.

2) **Visible Mark, Pole**

IHO Definition: A point at which a distance from an origin along a feature is given for information and which is marked by a pole.

3) **Visible Mark, Board**

IHO Definition: A point at which a distance from an origin along a feature is given for information and which is marked by a board.

4) **Visible Mark, Unknown Shape**

IHO Definition: A point at which a distance from an origin along a feature is given for information and which is physically marked, but the shape of the mark is not known or not given.

Remarks:

No remarks.

27.37 category of dock (CATDOC)

IHO Definition: **CATEGORY OF DOCK**. Classification of vessel dock.

Attribute Type: Enumeration

1) **tidal**

IHO Definition: A dock which is open to the sea and in which the water level is affected by tides. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.28, November 2000).

2) **wet dock**

IHO Definition: A dock in which water can be maintained at any level by closing a gate when the water is at the desired level. (IHO Dictionary – S-32).

Remarks:

No remarks.

27.38 category of dolphin

IHO Definition: **CATEGORY OF DOLPHIN**. Classification of a post or group of posts, used for mooring or warping a vessel. (Adapted from IHO dictionary – S-32).

Attribute Type: Enumeration

1) **mooring dolphin**

IHO Definition: A post or group of posts driven into the seabed or riverbed, used as a mooring point for vessels. (Adapted from Wikipedia).

2) **deviation dolphin**

IHO Definition: A post or group of posts, which a vessel may swing around for compass adjustment. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

3) **berthing dolphin**

IHO Definition: A post or group of posts driven into the seabed or riverbed, used to extend the berth of a vessel by providing extra mooring points.

4) **fender or breasting dolphin**

IHO Definition: A post or group of posts driven into the seabed or riverbed, used to assist in berthing of vessels by taking up some berthing loads; keep vessels from pressing against the pier structure; or to protect structures from possible impact by ships.

Remarks:

No remarks.

27.39 category of dumping ground (CATDPG)

IHO Definition: **CATEGORY OF DUMPING GROUND.** Classification of an area based on the type of waste being disposed of.

Attribute Type: Enumeration

2) **chemical waste dumping ground**

IHO Definition: An area at sea where chemical waste is dumped. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.29, November 2000).

3) **nuclear waste dumping ground**

IHO Definition: An area at sea where nuclear waste is dumped. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.29, November 2000).

4) **explosives dumping ground**

IHO Definition: An area at sea where explosives are dumped. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.29, November 2000).

5) **spoil ground**

IHO Definition: A sea area where dredged material is deposited. (IHO Dictionary – S-32).

6) **vessel dumping ground**

IHO Definition: An area at sea where disused vessels are scuttled. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.29, November 2000).

Remarks:

No remarks.

27.40 category of exceptional structure (catexs)

IHO Definition: Category of exceptional navigational structure.

1) **Lift-Lock**

IHO Definition: A lock of which the lock chamber itself is lifted vertically to level with the next waterway section.

2) **Aqueduct**

IHO Definition: A bridge supporting an artificially elevated channel, for the conveyance of water.

3) **Sloping Plane Lock**

IHO Definition: A lock of which the lock chamber itself travels over a sloping plane to level with the next waterway section.

4) **Water Slope Lock**

IHO Definition: In French "Pente d'Eau". A lock of which the lock chamber is formed by a sloping plane and moving gate, which is pushing a triangular section of water up along the slope to level with the next waterway section.

5) **Other**

IHO Definition: Being the one or ones distinct from that or those first mentioned or implied.

Remarks:

No remarks.

27.41 category of fence (CATFNC)

IHO Definition: **CATEGORY OF FENCE**. Classification of a physical boundary.

Attribute Type: Enumeration

1) **fence**

IHO Definition: A man-made barrier of relatively light structure used as an enclosure or boundary. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

3) **hedge**

IHO Definition: A continuous growth of shrubbery planted as a fence, a boundary or a wind break. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

4) **wall**

IHO Definition: A solid man-made barrier of generally heavy material used as an enclosure, boundary, or for protection. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

Remarks:

No remarks.

27.42 category of ferry (CATFRY)

IHO Definition: **CATEGORY OF FERRY**. Classification of the manoeuvrability of the ferry vessel, not the various types of ferry vessel.

Attribute Type: Enumeration

1) **free moving ferry**

IHO Definition: A ferry which may have routes that vary with weather, tide and traffic. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.32, November 2000).

2) **cable ferry**

IHO Definition: A ferry that follows a fixed route guided by a cable. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.32, November 2000).

3) **ice ferry**

IHO Definition: A winter-time ferry which crosses a lead. (Finnish Maritime Administration).

4) **swinging wire ferry**

IHO Definition: Ferry connected to a fixed point (for example an anchor in the middle of the waterway) and swings around this point from shore to shore via a cable to an anchor. The cable runs more or less parallel to the current.

5) **high speed ferry**

IHO Definition: A high speed water vessel for civilian use.

Remarks:

- The attribute “category of ferry” does not encode the various types of ferry vessel, but the manoeuvrability of the ferry. The value “cable ferry” indicates a ferry that follows a fixed route guided by a cable. A cable ferry and a swinging wire ferry may hinder the flow of other traffic.

27.43 category of fishing facility (CATFIF)

IHO Definition: **CATEGORY OF FISHING FACILITY**. Classification of fishing facility provided based on different fishing methods.

Attribute Type: Enumeration

1) fishing stake

IHO Definition: Poles or stakes placed in shallow water to outline a fishing ground or to catch fish. (IHO Dictionary – S-32).

2) fish trap

IHO Definition: A structure (usually portable) for catching fish. (Adapted from IHO Dictionary – S-32).

3) fish weir

IHO Definition: A fence of stakes or stones set in a river or along the shore to trap fish. (Adapted from IHO Dictionary – S-32).

4) tunny net

IHO Definition: A net built at sea for catching tunny. (IHO Dictionary – S-32).

Remarks:

No remarks.

27.44 category of fog signal (CATFOG)

IHO Definition: **CATEGORY OF FOG SIGNAL.** Classification of the various means of generating the fog signal.

Attribute Type: Enumeration

1) explosive

IHO Definition: A signal produced by the firing of explosive charges. (Admiralty List of Lights and Fog Signals).

2) diaphone

IHO Definition: A diaphone uses compressed air and generally emits a powerful low-pitched sound, which often concludes with a brief sound of suddenly lowered pitch, termed the “grunt”. (Admiralty List of Lights and Fog Signals).

3) siren

IHO Definition: A type of fog signal apparatus which produces sound by virtue of the passage of air through slots or holes in a revolving disk. (IHO Dictionary – S-32).

4) nautophone

IHO Definition: A horn having a diaphragm oscillated by electricity. (IHO Dictionary – S-32).

5) reed

IHO Definition: A reed uses compressed air and emits a weak, high pitched sound. (Admiralty List of Lights and Fog Signals).

6) tyfon

IHO Definition: A diaphragm horn which operates under the influence of compressed air or steam. (IHO Dictionary – S-32).

7) bell

IHO Definition: A ringing sound with a short range. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.34, November 2000).

8) whistle

IHO Definition: A distinctive sound made by a jet of air passing through an orifice. The apparatus may be operated automatically, by hand or by air being forced up a tube by waves acting on a buoy. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.34, November 2000).

9) gong

IHO Definition: A sound produced by vibration of a disc when struck. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.34, November 2000).

10) **horn**

IHO Definition: A horn uses compressed air or electricity to vibrate a diaphragm and exists in a variety of types which differ greatly in their sound and power. (Admiralty List of Lights and Fog Signals).

Remarks:

- The apparatus may be operated automatically, by hand or by wave action.
- The attribute **category of fog signal** encodes the various means of generating the signal. The classification **horn** is the generic term for fog signals **nautophone**, **reed** and **tyfon**.

27.45 category of fortified structure (CATFOR)

IHO Definition: **CATEGORY OF FORTIFIED STRUCTURE**. Classification of the different types of fortified structure.

Attribute Type: Enumeration

1) **castle**

IHO Definition: A large fortified building or structure. (Adapted from The Collins Dictionary).

2) **fort**

IHO Definition: A fortified enclosure, building, or position able to be defended against an enemy. (The Collins Dictionary).

3) **battery**

IHO Definition: A fortified structure on which artillery is mounted. (The Collins Dictionary).

4) **blockhouse**

IHO Definition: A concrete structure strengthened to give protection against enemy fire, with apertures to allow defensive gunfire. (The Collins Dictionary).

5) **fortified tower**

IHO Definition: A small circular fort with very thick walls (for example Martello tower). (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

6) **redoubt**

IHO Definition: An outwork or fieldwork usually square or polygonal and without flanking defences. (Concise Oxford Dictionary).

8) **fortified submarine shelter**

IHO Definition: A fortified pen to hold submarines.

9) **rampart**

IHO Definition: Anything serving as a bulwark or defence.

Remarks:

No remarks.

27.46 category of frequency (catfrq)

IHO Definition: The electrical frequency provided by the power supply station.

1) **50Hz**

IHO Definition: 50 Hertz

2) **60Hz**

IHO Definition: 60 Hertz

Remarks:

- No remarks.

27.47 category of gate (CATGAT)

IHO Definition: **CATEGORY OF GATE.** Classification of a structure that can be swung, drawn, or lowered to block an entrance or a passageway.

Attribute Type: Enumeration

2) **flood barrage gate**

IHO Definition: An opening gate used to control flood water. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

3) **caisson**

IHO Definition: A steel structure used for closing the entrance of locks, wet and dry docks. (IHO Dictionary – S-32).

4) **lock gate**

IHO Definition: Pair of massive hinged doors at each end of a lock. (IHO Dictionary – S-32).

5) **dyke gate**

IHO Definition: An opening gate in a dyke. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

6) **sluice**

IHO Definition: A sliding gate or other contrivance for changing the level of a body of water by controlling the flow into or out of it. (IHO Dictionary – S-32).

Remarks:

- No remarks.

27.48 category of harbour area (cathbr)

IHO Definition: Classification of a harbour.

1) **Custom Harbour**

IHO Definition: A harbour that is administered by the customs. It may be a free harbour.

2) **Port of Refuge**

IHO Definition: A harbour that can be used to find shelter for bad environmental conditions or where efforts to mitigate larger damage or threat(s) of damage to either the vessel, her crew or the environment can be rendered.

3) **Yacht Harbour/Marina**

IHO Definition: A harbour facility for small boats, yachts, etc., where supplies, repairs, and various services are available.

4) **Fishing Harbour**

IHO Definition: A harbour with facilities for fishing boats.

5) **Private Harbour**

IHO Definition: A harbour operated by a private body.

Remarks:

No remarks.

27.49 category of harbour facility (CATHAF)

IHO Definition: **CATEGORY OF HARBOUR FACILITY.** Classification of harbour use.

Attribute Type: Enumeration

1) **RoRo terminal**

IHO Definition: A terminal for roll-on roll-off ferries. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.38, November 2000).

3) **ferry terminal**

IHO Definition: A terminal for passenger and vehicle ferries. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.38, November 2000).

4) **fishing harbour**

IHO Definition: A harbour with facilities for fishing boats. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.38, November 2000).

5) **yacht harbour/marina**

IHO Definition: A harbour facility for small boats, yachts, etc., where supplies, repairs, and various services are available. (IHO Dictionary – S-32).

6) **naval base**

IHO Definition: A centre of operations for naval vessels. (Adapted from The Collins Dictionary).

7) **tanker terminal**

IHO Definition: A terminal for the bulk handling of liquid cargoes. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.38, November 2000).

8) **passenger terminal**

IHO Definition: A terminal for the loading and unloading of passengers. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.38, November 2000).

9) **shipyard**

IHO Definition: A place where ships are built or repaired. (IHO Dictionary – S-32).

10) **container terminal**

IHO Definition: A terminal with facilities to load/unload or store shipping containers. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.38, November 2000, as amended).

11) **bulk terminal**

IHO Definition: A terminal for the handling of bulk materials such as iron ore, coal, etc. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.38, November 2000).

12) **ship lift**

IHO Definition: A platform powered by synchronous electric motors (for example syncrolift) used to lift vessels (larger than boats) in and out of the water. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.38, November 2000).

13) **straddle carrier**

IHO Definition: A wheeled vehicle designed to lift and carry containers or vessels within its own framework. It is used for moving, and sometimes stacking, shipping containers and vessels. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.39, November 2000).

14) service harbour

IHO Definition: A harbour within which the floating equipment (dredges, tugs ...) of harbour services are stationed.

15) pilotage service

IHO Definition: The services of a person who directs the movements of a vessel through pilot waters, usually a person who has demonstrated extensive knowledge of channels, aids to navigation, dangers to navigation, etc., in a particular area and is licensed for that area, are available. (Adapted from IHO Hydrographic Dictionary – S-32).

16) service and repair

IHO Definition: A place where mechanical services or repairs can be undertaken to engines or other vessel equipment.

17) quarantine station

IHO Definition: A medical control center located in an isolated spot ashore where patients with contagious diseases from vessel in quarantine are taken.

18) Official Transshipment Point For Large-Volume And Heavy Goods

A terminal where large-volume and heavy goods according to the applicable national legislation can be transshipped.

Remarks:

No remarks.

27.50 category of hulk (CATHLK)

IHO Definition: **CATEGORY OF HULK.** Classification of an old or unseaworthy ship used for a new function.

Attribute Type: Enumeration

1) floating restaurant

IHO Definition: A permanently moored floating structure (for example: an old ship) that is used as a restaurant. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

2) historic ship

IHO Definition: A ship of historical interest permanently moored as a tourist attraction. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

3) floating museum

IHO Definition: A permanently moored floating structure (for example: an old ship) that is used as a museum. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

4) floating accommodation

IHO Definition: A permanently moored floating structure (for example: an old ship) that is used for accommodation. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

5) floating breakwater

IHO Definition: A permanently moored floating structure, often constructed from old ships, used as a breakwater. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.40, November 2000).

6) casino

IHO Definition: A permanently moored floating structure, such as an old ship, used as a casino boat.

7) training vessel

IHO Definition: A permanently moored floating structure, often constructed from old ships, used for training purposes.

Remarks:
No remarks.

27.51 category of installation buoy (CATINB)

IHO Definition: **CATEGORY OF INSTALLATION BUOY.** Classification of fixed installation buoy.

Attribute Type: Enumeration

1) **catenary anchor leg mooring**

IHO Definition: Incorporates a large buoy which remains on the surface at all times and is moored by 4 or more anchors. Mooring hawsers and cargo hoses lead from a turntable on top of the buoy, so that the buoy does not turn as the ship swings to wind and stream. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.42, November 2000).

2) **single buoy mooring**

IHO Definition: A large mooring buoy used by tankers to load and unload in port approaches or in offshore oil and gas fields. (IHO Dictionary – S-32).

Remarks:

No remarks.

27.52 category of land region (CATLND)

IHO Definition: **CATEGORY OF LAND REGION.** General terms for describing landscapes.

Attribute Type: Enumeration

1) **fen**

IHO Definition: A type of bog, especially a low-lying area, wholly or partly covered with water and dominated by grass-like plants, grasses, sedges and reeds. (The New Encyclopaedia Britannica, 15th Edition 1991).

2) **marsh**

IHO Definition: An area of wet, often spongy ground that is subject to frequent flooding or tidal inundations, but not considered to be continually under water. It is characterized by the growth of non woody plants and by the lack of trees. (Nautical Chart Manual, US National Oceanic and Atmospheric Administration – NOAA, 1992).

3) **bog**

IHO Definition: Wet spongy ground consisting of decaying vegetation, which retains stagnant water, too soft to bear the weight of any heavy body. (IHO Dictionary – S-32).

4) **heathland**

IHO Definition: A tract of wasteland peat bog, usually covered by a low scrubby growth, but may have scattered small open water holes. (Nautical Chart Manual, US National Oceanic and Atmospheric Administration – NOAA, 1992).

5) **mountain range**

IHO Definition: A series of connected and aligned mountains or mountain ridges. (Nautical Chart Manual, US National Oceanic and Atmospheric Administration – NOAA, 1992).

6) **lowlands**

IHO Definition: Low and relatively level land at a lower elevation than adjoining areas. (Nautical Chart Manual, US National Oceanic and Atmospheric Administration – NOAA, 1992).

7) **canyon lands**

IHO Definition: A relatively narrow, deep depression with steep sides, the bottom of which generally has a continuous slope. (IHO Dictionary – S-32).

8) **paddy field**

IHO Definition: A piece of land set aside for crops which are periodically flooded (for example rice paddy). (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.44, November 2000).

9) **agricultural land**

IHO Definition: Of or pertaining to the science or practice of cultivating the soil and rearing animals. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

10) **savanna/grassland**

IHO Definition: An open grassy plain with few or no trees in a tropical or subtropical region; a tract covered mainly by grasses that have little or no woody tissue. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

11) **parkland**

IHO Definition: A piece of ground kept for ornament and/or recreation or maintained in its natural state as a public property or area. (Websters New Collegiate Dictionary 1975).

12) **swamp**

IHO Definition: An area of spongy land saturated with water. It may have a shallow covering of water, usually with a considerable amount of vegetation appearing above the surface. (IHO Dictionary – S-32).

13) **landslide**

IHO Definition: The sliding down of a mass of land on a mountain or cliff-side; land which has so fallen. (IHO Dictionary – S-32).

14) **lava flow**

IHO Definition: The substance that results from the cooling of molten rock. (Adapted from IHO Dictionary – S-32).

15) **salt pan**

IHO Definition: Shallow pools of brackish water used for the natural evaporation of sea water to obtain salt. (IHO Dictionary – S-32).

16) **moraine**

IHO Definition: Any accumulation of loose material deposited by a glacier. (Nautical Chart Manual, US National Oceanic and Atmospheric Administration – NOAA, 1992).

17) **crater**

IHO Definition: Bowl-shaped cavity, at the summit or on the side of a volcano. (IHO Dictionary – S-32). Also a hole formed by the impact of a meteor. (Nautical Chart Manual, US National Oceanic and Atmospheric Administration – NOAA, 1992).

18) **cave**

IHO Definition: A natural subterranean chamber or series of chambers open to the earth's surface. (Merriam-Webster On-line Dictionary, March 2010).

19) **rock column or pinnacle**

IHO Definition: Any high tower or spire-shaped pillar of rock, alone or cresting a summit. (IHO Dictionary – S-32).

20) **cay**

IHO Definition: A small insular feature usually with scant vegetation; usually of sand or coral. Often applied to smaller coral shoals. (United Kingdom Hydrographic Office – UKHO – The Mariners Handbook).

21) **wadi**

IHO Definition: A watercourse that is permanently dry or dry except for the rainy season. (IHO Dictionary – S-32).

Remarks:

- The attribute **category of land region** encodes general terms for describing landscapes.

27.53 category of landmark (CATLMK)

IHO Definition: **CATEGORY OF LANDMARK**. Classification of prominent cultural and natural features in the landscape.

Attribute Type: Enumeration

1) **cairn**

IHO Definition: A mound of stones, usually conical or pyramidal, raised as a landmark or to designate a point of importance in surveying. (IHO Dictionary – S-32).

2) **cemetery**

IHO Definition: A site and associated structures devoted to the burial of the dead. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

3) **chimney**

IHO Definition: A vertical structure containing a passage or flue for discharging smoke and gases of combustion. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

4) **dish aerial**

IHO Definition: A parabolic aerial for the receipt and transmission of high frequency radio signals. (IHO Dictionary – S-32).

5) **flagstaff**

IHO Definition: A staff or pole on which flags are raised. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

6) **flare stack**

IHO Definition: A tall structure used for burning-off waste oil or gas. (IHO Dictionary – S-32).

7) **mast**

IHO Definition: A relatively tall structure usually held vertical by guy lines.

8) **windsock**

IHO Definition: A tapered fabric sleeve mounted so as to catch and swing with the wind, thus indicating the wind direction. (Navigation Dictionary, US National Oceanic and Atmospheric Administration – NOAA, 1969).

9) **monument**

IHO Definition: A structure erected and/or maintained as a memorial to a person and/or event. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

10) **column/pillar**

IHO Definition: A cylindrical or slightly tapering body of considerably greater length than diameter erected vertically. (Oxford English Dictionary).

11) **memorial plaque**

IHO Definition: A slab of metal, usually ornamented, erected as a memorial to a person or event. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.46, November 2000).

12) **obelisk**

IHO Definition: A tapering shaft usually of stone or concrete, square or rectangular in section, with a pyramidal apex. (Adapted from Oxford English Dictionary).

13) statue

IHO Definition: A representation of a living being, sculptured, moulded, or cast in a variety of materials (for example: marble, metal, or plaster). (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

14) cross

IHO Definition: A monument, or other structure in form of a cross. (Funk & Wagnalls Dictionary).

15) dome

IHO Definition: A landmark comprising a hemispherical or spheroidal shaped structure. (Adapted from the Macquarie Dictionary).

16) radar scanner

IHO Definition: A device used for directing a radar beam through a search pattern. (Adapted from Navigation Dictionary, US National Oceanic and Atmospheric Administration – NOAA, 1969).

17) tower

IHO Definition: A relatively tall, narrow structure that may either stand alone or may form part of another structure. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

18) windmill

IHO Definition: A system of vanes attached to a tower and driven by wind (excluding wind turbines). (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

20) spire/minaret

IHO Definition: A tall conical or pyramid-shaped structure often built on the roof or tower of a building, especially a church or mosque. (Adapted from The New Shorter Oxford English Dictionary, 1993).

21) large rock or boulder on land

IHO Definition: An isolated rocky formation or a single large stone. (Adapted from IHO Dictionary – S-32).

22) triangulation mark

IHO Definition: A recoverable point on the earth, whose geographic position has been determined by angular methods with geodetic instruments. A triangulation point is a selected point, which has been marked with a station mark, or it is a conspicuous natural or artificial feature. (IHO Dictionary – S-32).

23) boundary mark

IHO Definition: A marker identifying the location of a surveyed boundary line. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

24) observation wheel

IHO Definition: Wheels with passenger cars mounted external to the rim and independently rotated by electric motors. (Wikipedia, 2019).

25) torii

IHO Definition: A form of decorative gateway or portal, consisting of two upright wooden posts connected at the top by two horizontal crosspieces, commonly found at the entrance to Shinto temples.

26) bridge

IHO Definition: A structure erected over a depression or an obstacle such as a body of water, railroad, etc., to provide a roadway for vehicles or pedestrians. (IHO Dictionary – S-32).

27) dam

IHO Definition: A barrier to check or confine anything in motion; particularly one constructed to hold back water and raise its level to form a reservoir, or to prevent flooding. (IHO Dictionary – S-32).

Remarks:

No remarks.

27.54 category of lateral mark (CATLAM)

IHO Definition: **CATEGORY OF LATERAL MARK.** Classification of lateral marks in the IALA Buoyage System.

Attribute Type: Enumeration

1) port-hand lateral mark

IHO Definition: Indicates the port boundary of a navigational channel or suggested route when proceeding in the “conventional direction of buoyage”. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.47, November 2000).

2) starboard-hand lateral mark

IHO Definition: Indicates the starboard boundary of a navigational channel or suggested route when proceeding in the “conventional direction of buoyage”. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.47, November 2000).

3) preferred channel to starboard lateral mark

IHO Definition: At a point where a channel divides, when proceeding in the “conventional direction of buoyage”, the preferred channel (or primary route) is indicated by a modified port-hand lateral mark. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.47, November 2000).

4) preferred channel to port lateral mark

IHO Definition: At a point where a channel divides, when proceeding in the “conventional direction of buoyage”, the preferred channel (or primary route) is indicated by a modified starboard-hand lateral mark. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.47, November 2000).

5) right-hand side of the waterway

IHO Definition: Indicates the right-hand side of the inland waterway.

6) left-hand side of the waterway

IHO Definition: Indicates the left-hand side of the inland waterway.

7) right-hand side of the channel

IHO Definition: Indicates the right-hand side of a channel of an inland waterway.

8) left-hand side of the channel

IHO Definition: Indicates the left-hand side of a channel of an inland waterway.

9) bifurcation of the waterway

IHO Definition: Indicates a bifurcation of the inland waterway.

10) bifurcation of the channel

IHO Definition: Indicates a bifurcation of a channel of an inland waterway.

11) channel near the right bank

IHO Definition: Indicates that the channel is near the right bank.

12) channel near the left bank

IHO Definition: Indicates that the channel is near the left bank.

13) channel cross-over to the right bank

IHO Definition: Indicates that the channel crosses from the left to the right bank.

14) channel cross-over to the left bank

IHO Definition: Indicates that the channel crosses from the left to the left bank.

15) danger point or obstacles at the right-hand side

IHO Definition: Indicates a danger point or obstacles at the right-hand side.

16) danger point or obstacles at the left-hand side

IHO Definition: Indicates a danger point or obstacles at the left-hand side.

17) turn off at the right-hand side

IHO Definition: Indicates a turn off at the right-hand side.

18) turn off at the left-hand side

IHO Definition: Indicates a turn off at the left-hand side.

19) junction at the right-hand side

IHO Definition: Indicates a junction at the right-hand side.

20) junction at the left-hand side

IHO Definition: Indicates a junction at the left-hand side.

21) harbour entry at the right-hand side

IHO Definition: Indicates a harbour entry at the right-hand side.

22) harbour entry at the left-hand side

IHO Definition: Indicates a harbour entry at the left-hand side.

23) bridge pier mark

IHO Definition: Indicates a bridge pier in an inland waterway.

24) entry from a lake to a narrower waterway, right bank

IHO Definition: Indicates the right bank of the entry from a lake or a lake-like expansion to a section of the waterway which is narrower.

25) entry from a lake to a narrower waterway, left bank

IHO Definition: Indicates the left bank of the entry from a lake or a lake-like expansion to a section of the waterway which is narrower.

26) change bank

IHO Definition: Change bank.

27) continue along bank

IHO Definition: Continue along bank.

Remarks:

- There are two international buoyage regions, A and B, between which lateral marks differ. The buoyage region is encoded using the separate attribute **marks navigational – system of** (see clause 27.170). When lights are fitted to these marks, they are encoded as separate features.
- At sea the “conventional direction of buoyage” may be either the general direction taken by the boatmaster when approaching a harbour, river, estuary or other waterway from seaward, or the direction determined by the proper authority, which in principle follows a clockwise direction around land masses.

27.55 category of light (CATLIT)

IHO Definition: **CATEGORY OF LIGHT.** Classification of different light types.

Attribute Type: Enumeration

4) leading light

IHO Definition: A light associated with other lights so as to form a leading line to be followed. (Adapted from IHO Dictionary – S-32).

5) aero light

IHO Definition: An aero light is established for aeronautical navigation and may be of higher power than marine lights and visible from well offshore. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.48, November 2000).

8) **flood light**

IHO Definition: A broad beam light used to illuminate a structure or area. (Adapted from The Collins Dictionary).

9) **strip light**

IHO Definition: A light whose source has a linear form generally horizontal, which can reach a length of several metres. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.48, November 2000).

10) **subsidiary light**

IHO Definition: A light placed on or near the support of a main light and having a special use in navigation. (Admiralty List of Radio Signals, UK Hydrographic Office).

11) **spotlight**

IHO Definition: A powerful light focused so as to illuminate a small area. (The Collins Dictionary).

12) **front**

IHO Definition: Term used with leading lights to describe the position of the light on the lead as viewed from seaward. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.49, November 2000).

13) **rear**

IHO Definition: Term used with leading lights to describe the position of the light on the lead as viewed from seaward. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.49, November 2000).

14) **lower**

IHO Definition: Term used with leading lights to describe the position of the light on the lead as viewed from seaward. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.49, November 2000).

15) **upper**

IHO Definition: Term used with leading lights to describe the position of the light on the lead as viewed from seaward. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.49, November 2000).

17) **emergency**

IHO Definition: A light available as a backup to a main light which will be illuminated should the main light fail. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.49, November 2000).

18) **bearing light**

IHO Definition: A light which enables its approximate bearing to be obtained without the use of a compass. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.49, November 2000).

19) **horizontally disposed**

IHO Definition: A group of lights of identical character and almost identical position, that are disposed horizontally. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.49, November 2000).

20) **vertically disposed**

IHO Definition: A group of lights of identical character and almost identical position, that are disposed vertically. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.49, November 2000).

Remarks:

No remarks

27.56 category of marine farm/culture (CATMFA)

IHO Definition: **CATEGORY OF MARINE FARM/CULTURE.** Classification of an area of water devoted to the raising, breeding, or production of a specific aquatic animal.

Attribute Type: Enumeration

1) **crustaceans**

IHO Definition: Hard shelled animals, for example crabs or lobsters. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.50, November 2000).

2) **edible bivalve molluscs**

IHO Definition: A two-part hinged external shell covering that contains a soft-bodied invertebrate. (Adapted from NOAA National Ocean Service).

3) **fish**

IHO Definition: Vertebrate cold blooded animal with gills, living in water. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.50, November 2000).

4) **seaweed**

IHO Definition: The general name for marine plants of the Algae class which grow in long narrow ribbons. (International Maritime Dictionary, 2nd Ed.).

5) **pearl culture farm**

IHO Definition: An area where pearls are artificially cultivated. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.50, November 2000).

Remarks:

No remarks.

27.57 category of military practice area (CATMPA)

IHO Definition: **CATEGORY OF MILITARY PRACTICE AREA.** Classification of area by military use.

Attribute Type: Enumeration

2) **torpedo exercise area**

IHO Definition: An area within which exercises are carried out with torpedoes. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.52, November 2000).

3) **submarine exercise area**

IHO Definition: An area within which submarine exercises are carried out. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.52, November 2000).

4) **firing danger area**

IHO Definition: Areas for bombing and missile exercises. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.52, November 2000).

5) **mine-laying practice area**

IHO Definition: An area within which mine laying exercises are carried out. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.52, November 2000).

6) **small arms firing range**

IHO Definition: An area for shooting pistols, rifles and machine guns etc. at a target. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.52, November 2000).

Remarks:

No remarks.

27.58 category of mooring area

IHO Definition: **CATEGORY OF MOORING AREA.** Classification of an area in which vessels may be secured to mooring buoys. (Adapted from IHO dictionary – S-32).

Attribute Type: Enumeration

1) **small craft mooring area**

IHO Definition: An area in which yachts and small boats moor. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.11, November 2000).

2) **mooring area for visitors**

IHO Definition: An area set aside for the mooring of visiting vessels. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

3) **mooring area for tankers**

IHO Definition: An area set aside for the mooring of tankers. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

Remarks:

No remarks.

27.59 category of navigation line (CATNAV)

IHO Definition: **CATEGORY OF NAVIGATION LINE.** Classification of route guidance given to vessels.

Attribute Type: Enumeration

1) **clearing line**

IHO Definition: A straight line that marks the boundary between a safe and a dangerous area or that passes clear of a navigational danger. (Adapted from IHO Dictionary, S-32).

2) **transit line**

IHO Definition: A line passing through one or more fixed marks. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.55, November 2000).

3) **leading line bearing a recommended track**

IHO Definition: A line passing through one or more clearly defined objects, along the path of which a vessel can approach safely up to a certain distance off. (Adapted from IHO Dictionary, S-32).

Remarks:

No remarks.

27.60 category of notice mark (catnmk)

IHO Definition: Category of notice mark.

1) **(A.1) No Entry (General Sign)**

IHO Definition: Prohibition mark A.1: No entry.

2) **(A.1.1) Sections Closed to Use, No Entry Except for Non-Motorized Small Craft**

IHO Definition: Sections closed to use, no entry except for non-motorized small craft.

3) **(A.2) No Overtaking**

IHO Definition: Prohibition mark A.2: No overtaking.

4) **(A.3) No Overtaking of Convoys by Convoys**

IHO Definition: Prohibition mark A.3: No overtaking of convoys by convoys.

5) (A.4) No Passing or Overtaking

IHO Definition: Prohibition mark A.4: No passing or overtaking.

6) (A.5) No Berthing on the Side of the Waterway on Which the Sign is Placed

IHO Definition: Prohibition mark A.5: No berthing (i.e. no anchoring or making fast to the bank) on the side of the waterway on which the sign is placed.

7) (A.5.1) No Berthing on the Stretch of Water Whose Breadth, Measured from the Sign, is Shown in Metres on the Sign

IHO Definition: Prohibition mark A.5.1: No berthing on the stretch of water whose breadth, measured from the sign, is shown in metres on the sign.

8) (A.6) No Anchoring or Trailing of Anchors, Cables or Chains

IHO Definition: Prohibition mark A.6: No anchoring or trailing of anchors, cables or chains on the side of the waterway on which the sign is placed.

9) (A.7) No Making Fast to the Bank

IHO Definition: Prohibition mark A.7: No making fast to the bank on the side of the waterway on which the sign is placed.

10) (A.8) No Turning

IHO Definition: Prohibition mark A.8: No turning.

11) (A.9) Do Not Create Wash

IHO Definition: Prohibition mark A.9: Do not create wash likely to cause damage.

12) (A.10) No Passing on Left Side (In Openings of Bridges or Weirs)

IHO Definition: Prohibition mark A.10: No passing on the left side outside the area marked (in openings of bridges or weirs).

13) (A.10) No Passing on Right Side (In Openings of Bridges or Weirs)

IHO Definition: Prohibition mark A.10: No passing on the right side (in openings of bridges or weirs).

14) (A.12) Motorized Craft Prohibited

IHO Definition: Prohibition mark A.12: Motorized craft prohibited.

15) (A.13) Sports and Pleasure Craft Prohibited

IHO Definition: Prohibition mark A.13: Sports and pleasure craft prohibited.

16) (A.14) Water Skiing Prohibited

IHO Definition: Prohibition mark A.14: Water skiing prohibited.

17) (A.15) Sailing Vessels Prohibited

IHO Definition: Prohibition mark A.15: Sailing vessels prohibited.

18) (A.16) All Craft Other Than Motorized Vessels or Sailing Craft Prohibited

IHO Definition: Prohibition mark A.16: All craft other than motorized vessels or sailing craft prohibited.

19) (A.17) Use of Sailboards Prohibited

IHO Definition: Prohibition mark A.17: Use of sailboards prohibited.

20) (A.20) Water Bikes Prohibited

IHO Definition: Prohibition mark A.20: Water bikes prohibited.

21) (A.18) End of Zone Authorized for High Speed Navigation of Small Sport and Pleasure Craft

IHO Definition: Prohibition mark A.18: End of zone authorized for high speed navigation of small sport and pleasure craft.

22) (A.19) No Launching or Beaching of Vessels

IHO Definition: Prohibition mark A.19: No launching or beaching of vessels.

23) (B.1) Proceed in Left Direction

IHO Definition: Regulation mark B.1: Proceed in the left direction as shown by the arrow.

24) (B.1) Proceed in Right Direction

IHO Definition: Regulation mark B.1: Proceed in the right direction as shown by the arrow.

25) (B.2a) Move to the Side of the Fairway on Your Port Side

IHO Definition: Regulation mark B.2a: Move to the side of the fairway on your port side.

26) (B.2b) Move to the Side of the Fairway on Your Starboard Side

IHO Definition: Regulation mark B.2b: Move to the side of the fairway on your starboard side.

27) (B.3a) Keep on the Side of the Fairway on Your Port Side

IHO Definition: Regulation mark B.3a: Keep to the side of the fairway on your port side.

28) (B.3b) Keep on the Side of the Fairway on Your Starboard Side

IHO Definition: Regulation mark B.3b: Keep to the side of the fairway on your starboard side.

29) (B.4a) Cross Fairway to Port

IHO Definition: Regulation mark B.4a: Cross fairway to port.

30) (B.4b) Cross Fairway to Starboard

IHO Definition: Regulation mark B.4b: Cross fairway to starboard.

31) (B.5) Stop as Prescribed in the Regulations

IHO Definition: Regulation mark B.5: Stop as prescribed in the regulations.

32) (B.6) Do Not Exceed the Speed Indicated (in km/h)

IHO Definition: Regulation mark B.6: Do not exceed the speed indicated (in km/h).

33) (B.7) Give a Sound Signal

IHO Definition: Regulation mark B.7: Give a sound signal.

34) (B.8) Keep a Particularly Sharp Lookout

IHO Definition: Regulation mark B.8: Keep a particularly sharp lookout.

35) (B.9a) Do Not Enter the Main Waterway Until Certain that This Will Not Oblige Vessels Proceeding On It to Change their Course or Speed

IHO Definition: Regulation mark B.9a: Do not enter the main waterway until certain that this will not oblige vessels proceeding on it to change their course or speed.

36) (B.9b) Do Not Cross the Main Waterway Until Certain that This Will Not Oblige Vessels Proceeding On It to Change their Course or Speed

IHO Definition: Regulation mark B.9b: Do not cross the main waterway until certain that this will not oblige vessels proceeding on it to change their course or speed.

37) (B.11) Obligation to Enter Into a Radiotelephone Link on the Channel as Indicated on the Board

IHO Definition: Regulation mark B.11: Obligation to enter into a radiotelephone link on the channel as indicated on the board.

38) (C.1) Depth of Water Limited

IHO Definition: Restriction mark C.1: Depth of water limited.

39) (C.2) Headroom Limited

IHO Definition: Restriction mark C.2: Headroom limited.

40) (C.3) Width of Passage or Channel Limited

IHO Definition: Restriction mark C.3: Width of passage or channel limited.

41) (C.4) There Are Restrictions on Navigation

IHO Definition: Restriction mark C.4: There are restrictions on navigation: See the information plate below the main sign.

42) (C.5) The Channel Lies at a Distance From the Left Bank

IHO Definition: Restriction mark C.5: The channel lies at a distance from the left bank; the figure shown on the sign indicates the distance in metres, measured from the sign, to which vessels should keep.

43) (C.5) The Channel Lies at a Distance From the Right Bank

IHO Definition: Restriction mark C.5: The channel lies at a distance from the right bank; the figure shown on the sign indicates the distance in metres, measured from the sign, to which vessels should keep.

44) (D.1a) Recommended Channel in Both Directions

IHO Definition: Recommendation mark D.1a: Recommended channel in both directions.

45) (D.1b) Recommended Channel Only in the Direction Indicated, Passage in the Opposite Direction Prohibited (at Bridges)

IHO Definition: Recommendation mark D.1b: Recommended channel only in the direction indicated, passage in the opposite direction prohibited (at bridges).

46) (D.2) You are Recommended to Keep on Right Side (in Openings of Bridges and Weirs)

IHO Definition: Recommendation mark D.2: You are recommended to keep on right side (in openings of bridges and weirs).

47) (D.2) You are Recommended to Keep on Left Side (in Openings of Bridges and Weirs)

IHO Definition: Recommendation mark D.2: You are recommended to keep on left side (in openings of bridges and weirs).

48) (D.3) You Are Recommended to Proceed in the Left Direction

IHO Definition: Recommendation mark D.3: You are recommended to proceed in the left direction.

49) (D.3) You Are Recommended to Proceed in the Right Direction

IHO Definition: Recommendation mark D.3: You are recommended to proceed in the right direction.

50) (E.1) Entry Permitted (General Sign)

IHO Definition: Information mark E.1: Entry permitted (general sign).

51) (E.2) Overhead Cable Crossing

IHO Definition: Information mark E.2: Overhead cable crossing.

52) (E.3) Weir

IHO Definition: Information mark E.3: Weir.

53) (E.4a) Ferry-Boat Not Moving Independently

IHO Definition: Information mark E.4a: Ferry-boat not moving independently.

54) (E.4b) Ferry-Boat Moving Independently

IHO Definition: Information mark E.4b: Ferry-boat moving independently.

55) (E.5) Berthing (that is Anchoring or Making Fast to the Bank) Permitted

IHO Definition: Information mark E.5: Berthing (i.e. anchoring or making fast to the bank) permitted.

56) (E.5.1) Berthing Permitted on the Stretch of Water of the Breadth Measured From, and Shown on the Board in Metres

IHO Definition: Information mark E.5.1: Berthing permitted on the stretch of water of the breadth measured from, and shown on the board in metres.

57) (E.5.2) Berthing Permitted on the Stretch of Water Bounded by the Distances Measured From, and Shown on the Board in Metres

IHO Definition: Information mark E.5.2: Berthing permitted on the stretch of water bounded by the distances measured from, and shown on the board in metres.

58) (E.5.3) Maximum Number of Vessels Permitted to Berth Abreast

IHO Definition: Information mark E.5.3: Maximum number of vessels permitted to berth abreast on the side of the waterway on which the sign is placed.

59) (E.5.4) Berthing Area Reserved for Pushing-Navigation Vessels that are Not Required to Carry Blue Lights or Blue Cones

IHO Definition: Information mark E.5.4: Berthing area reserved for pushing-navigation vessels that are not required to carry the marking prescribed in article 3.14 on the side of the waterway on which the sign is placed.

60) (E.5.5) Berthing Area Reserved for Pushing-Navigation Vessels that are Required to Carry One Blue Light or One Blue Cone

IHO Definition: Information mark E.5.5: Berthing area reserved for pushing-navigation vessels that are required to carry one blue light or one blue cone under article 3.14, paragraph 1, on the side of the waterway on which the sign is placed.

61) (E.5.6) Berthing Area Reserved for Pushing-Navigation Vessels that are Required to Carry Two Blue Lights or Two Blue Cones

IHO Definition: Information mark E.5.6: Berthing area reserved for pushing-navigation vessels that are required to carry two blue lights or two blue cones under article 3.14, paragraph 2, on the side of the waterway on which the sign is placed.

62) (E.5.7) Berthing Area Reserved for Pushing-Navigation Vessels that are Required to Carry Three Blue Lights or Three Blue Cones

IHO Definition: Information mark E.5.7: Berthing area reserved for pushing-navigation vessels that are required to carry three blue lights or three blue cones under article 3.14, paragraph 3, on the side of the waterway on which the sign is placed.

63) (E.5.8) Berthing Area Reserved for Vessels Other Than Pushing-Navigation Vessels that are Not Required to Carry Blue Lights or Blue Cones

IHO Definition: Information mark E.5.8: Berthing area reserved for vessels other than pushing-navigation vessels that are not required to carry the marking prescribed in article 3.14 on the side of the waterway on which the sign is placed.

64) (E.5.9) Berthing Area Reserved for Vessels Other Than Pushing-Navigation Vessels that are Required to Carry One Blue Light or One Blue Cone

IHO Definition: Information mark E.5.9: Berthing area reserved for vessels other than pushing-navigation vessels that are required to carry one blue light or one blue cone under article 3.14, paragraph 1, on the side of the waterway on which the sign is placed.

65) (E.5.10) Berthing Area Reserved for Vessels Other Than Pushing-Navigation Vessels that are Required to Carry Two Blue Lights or Two Blue Cones

IHO Definition: Information mark E.5.10: Berthing area reserved for vessels other than pushing-navigation vessels that are required to carry two blue lights or two blue cones under article 3.14, paragraph 2, on the side of the waterway on which the sign is placed.

66) (E.5.11) Berthing Area Reserved for Vessels Other Than Pushing-Navigation Vessels that are Required to Carry Three Blue Lights or Three Blue Cones

IHO Definition: Information mark E.5.11: Berthing area reserved for vessels other than pushing-navigation vessels that are required to carry three blue lights or three blue cones under article 3.14, paragraph 3, on the side of the waterway on which the sign is placed.

67) (E.5.12) Berthing Area Reserved for All Vessels that are Not Required to Carry Blue Lights or Blue Cones

IHO Definition: Information mark E.5.12: Berthing area reserved for all vessels that are not required to carry the marking prescribed in article 3.14, on the side of the waterway on which the sign is placed.

68) (E.5.13) Berthing Area Reserved for All Vessels that are Required to Carry One Blue Light or One Blue Cone

IHO Definition: Information mark E.5.13: Berthing area reserved for all vessels that are required to carry one blue light or one blue cone under article 3.14, paragraph 1, on the side of the waterway on which the sign is placed.

69) (E.5.14) Berthing Area Reserved for All Vessels that are Required to Carry Two Blue Lights or Two Blue Cones

IHO Definition: Information mark E.5.14: Berthing area reserved for all vessels that are required to carry two blue lights or two blue cones on the side of the waterway on which the sign is placed.

70) (E.5.15) Berthing Area Reserved for All Vessels that are Required to Carry Three Blue Lights or Three Blue Cones

IHO Definition: Information mark E.5.15: Berthing area reserved for all vessels that are required to carry three blue lights or three blue cones under article 3.14, paragraph 3, on the side of the waterway on which the sign is placed.

71) (E.6) Anchoring or Trailing of Anchors, Cables or Chains Permitted

IHO Definition: Information mark E.6: Anchoring (see article 7.03, para. 2) or trailing of anchors, cables or chains permitted on the side of the waterway on which the sign is placed.

72) (E.7) Making Fast to the Bank Permitted

IHO Definition: Information mark E.7: Making fast to the bank permitted on the side of the waterway on which the sign is placed.

73) (E.7.1) Berthing Area Reserved for Loading and Unloading of Vehicles

IHO Definition: Information mark E.7.1: Berthing area reserved for loading and unloading vehicles. (Maximum duration of berthing permitted may be added on an information plate below the board).

74) (E.8) Turning Area

IHO Definition: Information mark E.8: Turning area.

75) (E.9a) Crossing With Secondary Waterway Ahead

IHO Definition: Information mark E.9a: Crossing with secondary waterway ahead.

76) (E.9b) Secondary Waterway Ahead on the Right

IHO Definition: Information mark E.9b: Secondary waterway ahead on the right.

77) (E.9c) Secondary Waterway Ahead on the Left

IHO Definition: Information mark E.9c: Secondary waterway ahead on the left.

78) (E.9d) Secondary Waterway Ahead, Main Waterway on the Right

IHO Definition: Information mark E.9d: Secondary waterway ahead, main waterway on the right.

79) (E.9e) Secondary Waterway Ahead, Main Waterway on the Left

IHO Definition: Information mark E.9e: Secondary waterway ahead, main waterway on the left.

80) (E.9f) Secondary Waterway on the Left, Main Waterway on the Right

IHO Definition: Information mark E.9f: Secondary waterway on the left, main waterway on the right.

81) (E.9g) Secondary Waterway on the Right, Main Waterway on the Left

IHO Definition: Information mark E.9g: Secondary waterway on the right, main waterway on the left.

82) (E.9h) Secondary Waterway Ahead and on the Left, Main Waterway on the Right

IHO Definition: Information mark E.9h: Secondary waterway ahead and on the left, main waterway on the right.

83) (E.9i) Secondary Waterway Ahead and on the Right, Main Waterway on the Left

IHO Definition: Information mark E.9i: Secondary waterway ahead and on the right, main waterway on the left.

84) (E.10a) Crossing with Main Waterway Ahead

IHO Definition: Information mark E.10a: Crossing with main waterway ahead.

85) (E.10b) Main Waterway Ahead

IHO Definition: Information mark E.10b: Main waterway ahead.

86) (E.10c) Junction with Main Waterway Ahead and Right

IHO Definition: Information mark E.10c: Junction with main waterway ahead and right.

87) (E.10d) Junction with Main Waterway Ahead and Left

IHO Definition: Information mark E.10d: Junction with main waterway ahead and left.

88) (E.10e) Junction with Main Waterway Ahead and Right, Secondary Waterway on the Left

IHO Definition: Information mark E.10e: Junction with main waterway ahead and right, secondary waterway on the left.

89) (E.10f) Junction with Main Waterway Ahead and Left, Secondary Waterway on the Right

IHO Definition: Information mark E.10f: Junction with main waterway ahead and left, secondary waterway on the right.

90) (E.11) End of Prohibition or Obligation Applying to Traffic in One Direction Only, or End of a Restriction

IHO Definition: Information mark E.11: End of prohibition or obligation applying to traffic in one direction only, or end of a restriction.

91) (E.13) Drinking Water Supply

IHO Definition: Information mark E.13: Drinking water supply.

92) (E.14) Telephone

IHO Definition: Information mark E.14: Telephone.

93) (E.15) Motorized Vessels Permitted

IHO Definition: Information mark E.15: Motorized vessels permitted.

94) (E.16) Sport and Pleasure Craft Permitted

IHO Definition: Information mark E.16: Sport and pleasure craft permitted.

95) (E.17) Water Skiing Permitted

IHO Definition: Information mark E.17: Water skiing permitted.

96) (E.18) Sailing Vessels Permitted

IHO Definition: Information mark E.18: Sailing vessels permitted.

97) (E.19) Craft Other Than Motorized Vessels or Sailing Craft Permitted

IHO Definition: Information mark E.19: Craft other than motorized vessels or sailing craft permitted.

98) (E.20) Use of Sailboards Permitted

IHO Definition: Information mark E.20: Use of sailboards permitted.

99) (E.23) Possibility of Obtaining Nautical Information by Radiotelephone on the Channel Indicated

IHO Definition: Information mark E.23: Possibility of obtaining nautical information by radiotelephone on the channel indicated.

100) (E.24) Water Bikes Permitted

IHO Definition: Information mark E.24: Water bikes permitted.

101) (E.21) Zone Authorized for High Speed Navigation of Small Sport and Pleasure Craft

IHO Definition: Information mark E.21: Zone authorized for high speed navigation of small sport and pleasure craft.

102) (E.22) Launching or Beaching of Vessels Permitted

IHO Definition: Information mark E.22: Launching or beaching of small craft permitted.

103) (BR) Proceed Close to the Margin on Your Port Side

IHO Definition: Regulation mark (BR): Proceed close to margin on your port side.

104) (BR) Proceed Close to the Margin on Your Starboard Side

IHO Definition: Regulation mark (BR): Proceed close to margin on your starboard side.

105) (BR) Proceed in the Middle of the River

IHO Definition: Regulation mark (BR): Proceed in the middle of the river.

106) (BR) Cross River to Port

IHO Definition: Regulation mark (BR): Cross river to port.

107) (BR) Cross River to Starboard

IHO Definition: Regulation mark (BR): Cross river to starboard.

108) (BR) Traffic Between Margins

IHO Definition: Information mark (BR): Traffic between margins.

109) (BR) Reduce Speed

IHO Definition: Regulation mark (BR): Reduce speed.

110) Wreck Pontoon, Passage Allowed on Side Showing Red-White Sign

IHO Definition: A red-white sign shown on a wreck pontoon to indicate the side on which passage is permitted (without wash of waves) and a red sign on the side on which passage is not permitted.

111) Wreck Pontoon, Passage Allowed on Both Sides

IHO Definition: Red-white signs shown on a wreck pontoon to indicate that passage is permitted on both sides (without wash of waves).

112) No Passing or Overtaking of Convoys

IHO Definition: Russian notice mark: 1.2, no passing or overtaking of convoys

113) Small Crafts Prohibited

IHO Definition: Russian notice mark: 1.5, small crafts prohibited.

114) Attention! (Keep Caution)

IHO Definition: Russian notice mark: 2.1, Attention! (keep caution)

115) Fairway Crossing

IHO Definition: Russian notice mark: 2.2, fairway crossing.

116) Shipping Inspection Point

IHO Definition: Russian notice mark: 3.3, shipping inspection point.

117) (E.25) Electrical Power Supply Point

IHO Definition: Information mark E.25: Electrical power supply point.

118) (E.26) Winter Harbour

IHO Definition: Information mark E.26: Winter harbour.

119) (E.26.1) Maximum Number of Vessels Permitted to Berth in Winter Harbour

IHO Definition: Information mark E.26.1: maximum number of vessels permitted to berth in winter harbour.

120) (E.27) Winter Shelter

IHO Definition: Information mark E.27: Winter shelter.

121) (E.27.1) Maximum Number of Vessels Permitted to Berth in Winter Shelter; Maximum Number of Vessels Permitted to Berth Abreast; Maximum Number of Rows of Vessels Which are Berthed Abreast

IHO Definition: Information mark E.27.1: Maximum number of vessels permitted to berth in winter shelter; maximum number of vessels permitted to berth abreast; maximum number of rows of vessels which are berthed abreast.

122) (E.6.1) Use of Spuds Permitted

IHO Definition: Information mark E.6.1: Use of spuds permitted.

123) (B.12) Obligation to Use Onshore Power Supply Point

IHO Definition: Regulation mark B.12: Obligation to use onshore power supply point.

124) (BR) Right Pillar In Passage For Tiete-Parana Waterway

IHO Definition: Regulation mark (BR): Right pillar in passage for Tiete-Parana Waterway (at bridges)

125) (BR) Left Pillar In Passage For Tiete-Parana Waterway

IHO Definition: Regulation mark (BR): Left pillar in passage for Tiete-Parana Waterway

126) (BR) Best Transit Point

IHO Definition: Information mark (BR): Best Transit Point

127) (BR) Mandatory Stopping Point for Tiete-Parana Waterway

IHO Definition: Regulation mark (BR): Mandatory Stopping Point for Tiete-Parana Waterway

128) (A.4.1) No Passing or Overtaking of Convoys by Convoys

IHO Definition: Prohibition Mark A.4.1: No passing or overtaking by convoys

Remarks:

No remarks.

27.61 category of obstruction (CATOBS)

IHO Definition: **CATEGORY OF OBSTRUCTION.** Classification of objects that impede movement.

Attribute Type: Enumeration

1) snag/stump

IHO Definition: A tree, branch or broken pile embedded in the ocean floor, river or lake bottom and not visible on the surface, forming thereby a hazard to vessels. (IHO Dictionary – S-32).

2) wellhead

IHO Definition: A submarine structure projecting some distance above the seabed and capping a temporarily abandoned or suspended oil or gas well. (IHO Dictionary – S-32).

3) diffuser

IHO Definition: A structure on an outfall through which liquids are discharged. The structure will usually project above the level of the outfall and can be an obstruction to navigation. (IHO Dictionary – S-32).

4) crib

IHO Definition: A permanent marine structure usually designed to support or elevate pipelines; especially a structure enclosing a screening device at the offshore end of a potable water intake pipe. The structure is

commonly a heavy timber enclosure that has been sunken with rocks or other debris. (IHO Dictionary – S-32).

5) **fish haven**

IHO Definition: Areas established by private interests, usually sport fishermen, to simulate natural reefs and wrecks that attract fish. The reefs are constructed by dumping assorted junk in areas which may be of very small extent or may stretch a considerable distance along a depth contour. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.56, November 2000).

6) **foul area**

IHO Definition: An area of numerous unidentified dangers to navigation. The area serves as a warning to the mariner that all dangers are not identified individually and that navigation through the area may be hazardous. (IHO Dictionary – S-32).

8) **ice boom**

IHO Definition: Floating barriers, anchored to the bottom, used to deflect the path of floating ice in order to prevent the obstruction of locks, intakes, etc., and to prevent damage to bridge piers and other structures. (Canadian Hydrographic Service, Chart specifications).

9) **ground tackle**

IHO Definition: Equipment such as anchors, concrete blocks, chains and cables, etc., used to position floating structures such as trot and mooring buoys etc. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.57, November 2000).

10) **boom**

IHO Definition: A floating barrier used to protect a river or harbour mouth or to create a sheltered area for storage purposes. (IHO Dictionary – S-32).

11) **fishing net**

A piece of open-meshed material made of twine, cord, or something similar, used for catching fish.

12) **wave energy device**

IHO Definition: A device to extract energy from the surface motion of ocean waves or from pressure fluctuations below the surface.

13) **subsurface ocean data acquisition system**

IHO Definition: A submerged device, not being a ship, together with its appurtenant equipment, deployed at sea essentially for the purpose of collecting, storing or transmitting samples or data relating to the marine environment. (Adapted from Wikipedia, 2018).

14) **artificial reef**

IHO Definition: A man-made structure that may mimic some of the characteristics of a natural reef, intended to attract sea life. (Adapted from NOAA National Ocean Service).

15) **template**

IHO Definition: A structure placed on the seafloor below a drilling rig to guide the drill. (Adapted from IHO Chart Specifications, S-4).

16) **manifold**

IHO Definition: A large steel structure up to 20 metres in height above the seafloor, or a steel frame secured to the seafloor with piles to anchor the end of a submarine pipeline, for delivery to a production platform. (Adapted from IHO Chart Specifications, S-4).

17) **submerged pingo**

IHO Definition: A hill of soil-covered ice pushed up by hydrostatic pressure in an area of permafrost that is located underwater.

18) **remains of platform**

IHO Definition: The distributed remains of a platform.

19) scientific instrument

IHO Definition: An instrument used for scientific purposes.

20) underwater turbine

IHO Definition: Any of various machines having a rotor, usually with vanes or blades, driven by the pressure, momentum, or reactive thrust of a moving fluid, as steam, water, hot gases, or air, either occurring in the form of free jets or as a fluid passing through and entirely filling a housing around the rotor and is located underwater.

21) active submarine volcano

IHO Definition: An active seabed volcano, which may be submerged or projecting above the water at the chart sounding datum. (Adapted from IHO Dictionary – S-32).

22) shark net

IHO Definition: A submerged net placed around beaches to reduce shark attacks on swimmers. (Wikipedia).

23) mangrove

IHO Definition: One of several genera of tropical trees or shrubs which produce many prop roots and grow along low-lying coasts into shallow water. (IHO Dictionary – S-32).

Remarks:

No remarks.

27.62 category of offshore platform (CATOFP)

IHO Definition: **CATEGORY OF OFFSHORE PLATFORM.** Classification of an offshore raised structure.

Attribute Type: Enumeration

1) oil rig

IHO Definition: A temporary mobile structure, either fixed or floating, used in the exploration stages of oil and gas fields. (IHO Dictionary – S-32).

2) production platform

IHO Definition: A term used to indicate a permanent offshore structure equipped to control the flow of oil or gas. It does not include entirely submarine structures. (Adapted from IHO Dictionary – S-32).

3) observation/research platform

IHO Definition: A platform from which one's surroundings or events can be observed, noted or recorded such as for scientific study. (Adapted from IHO Dictionary – S-32, Edition 5).

4) articulated loading platform

IHO Definition: A metal lattice tower, buoyant at one end and attached at the other by a universal joint to a concrete filled base on the seabed. The platform may be fitted with a helicopter platform, emergency accommodation and hawser/hose retrieval. (Adapted from United Kingdom Hydrographic Office CSDO 607.2 (12), May 1994).

5) single anchor leg mooring

IHO Definition: A rigid frame or tube with a buoyancy device at its upper end, secured at its lower end to a universal joint on a large steel or concrete base resting on the seabed, and at its upper end to a mooring buoy by a chain or wire. (Adapted from United Kingdom Hydrographic Office CSDO 607.2 (12), May 1994).

6) mooring tower

IHO Definition: A platform secured to the seabed and surmounted by a turntable to which ships moor. (Adapted from United Kingdom Hydrographic Office CSDO 607.2 (12), May 1994).

7) artificial island

IHO Definition: A man-made structure usually built for the exploration or exploitation of marine resources, marine scientific research, tidal observations, etc. (Adapted from IHO Dictionary – S-32).

8) floating production, storage and off-loading vessel

IHO Definition: An offshore facility consisting of a moored tanker/barge by which the product is extracted, stored and exported. (Adapted from United Kingdom Hydrographic Office CSDO 607.2 (13), May 1994).

9) accommodation platform

IHO Definition: A platform used primarily for eating, sleeping and recreation purposes. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.59, November 2000).

10) navigation, communication and control buoy

IHO Definition: A floating structure with control room, power and storage facilities, attached to the seabed by a flexible pipeline and cables. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.59, November 2000).

11) floating oil tank

IHO Definition: A floating structure, anchored to the seabed, for storing oil. (Adapted from IHO Hydrographic Dictionary – S-32).

Remarks:

No remarks.

27.63 category of offshore production area (CATPRA)

IHO Definition: **CATEGORY OF OFFSHORE PRODUCTION AREA.** Classification of an area at sea within which there are production facilities. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.113, November 2000).

Attribute Type: Enumeration

1) wind farm

IHO Definition: A collection of wind turbines that are collocated and are organized as a single power generation unit. (IHO Dictionary – S-32).

2) wave farm

IHO Definition: A collection of collocated devices which harness wave energy and are organized as a single power generation unit. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

3) current farm

IHO Definition: A collection of collocated devices which harness current (for example tidal) energy and are organized as a single power generation unit. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

4) tank farm

IHO Definition: A collection of collocated large-capacity tanks in which petroleum, natural gas, or liquid petrochemicals are stored. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

5) seabed material extraction area

IHO Definition: An area in which materials forming, or under, the seabed are removed.

6) solar farm

IHO Definition: A large-scale photovoltaic system (PV system) designed for the supply of merchant power into the electricity grid. They are differentiated from most building-mounted and other decentralised solar power applications because they supply power at the utility level, rather than to a local user or users. The generic expression utility-scale solar is sometimes used to describe this type of project. (Wikipedia).

Remarks:

No remarks.

27.64 category of oil barrier (CATOLB)

IHO Definition: **CATEGORY OF OIL BARRIER.** Classification of barriers used to prevent the unwanted spread of oil across the sea surface.

Attribute Type: Enumeration

1) **oil retention (high pressure pipe)**

IHO Definition: A pipe with holes from which air blows. When the air bubbles reach the surface they form a barrier which prevents the spread of oil. (Kort- og Matrikelstyrelsen, Denmark).

2) **floating oil barrier**

IHO Definition: A floating tube shaped structure, with a curtain (2 metre) hanging under it, below the surface, which prevents the spread of oil. (Kort- og Matrikelstyrelsen, Denmark).

Remarks:

No remarks.

27.65 category of opening bridge (CATBRG)

IHO Definition: **CATEGORY OF OPENING BRIDGE.** Classification of opening structures spanning and providing passage over a gap or barrier, such as a river or roadway.

Attribute Type: Enumeration

3) **swing bridge**

IHO Definition: A movable bridge (or span thereof) which rotates in a horizontal plane about a vertical pivot to allow the passage of vessels. (Adapted from IHO Dictionary – S-32).

4) **lifting bridge**

IHO Definition: A movable bridge (or span thereof) which is capable of being lifted vertically to allow vessels to pass beneath. (Adapted from IHO Dictionary – S-32).

5) **bascule bridge**

IHO Definition: A counterpoise bridge rotated in a vertical plane about an axis at one or both ends. (IHO Dictionary – S-32).

7) **drawbridge**

IHO Definition: A general name for bridges of which part or the entire span of the bridge may be raised or drawn aside to allow ships to pass through. (IHO Dictionary – S-32).

Remarks:

No remarks.

27.66 category of pile (CATPLE)

IHO Definition: **CATEGORY OF PILE.** Classification of pile, driven into the earth as a foundation or support for a structure.

Attribute Type: Enumeration

1) **stake**

IHO Definition: An elongated wood or metal pole embedded in the seabed to serve as a marker or support. (Adapted from IHO Dictionary – S-32).

3) post

IHO Definition: A vertical piece of timber, metal or concrete forced into the earth or seabed. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

4) tripodal

IHO Definition: A single structure comprising 3 or more piles held together (sections of heavy timber, steel or concrete), and forced into the earth or seabed. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.61, November 2000).

5) piling

IHO Definition: A number of piles, usually in a straight line, and usually connected or bolted together. (Adapted from IHO Dictionary – S-32).

6) area of piles

IHO Definition: A number of piles, usually in a straight line, but not connected by structural members (Australian Hydrographic Office).

7) pipe

IHO Definition: A vertical hollow cylinder of metal, wood, or other material forced into the earth or seabed. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.61, November 2000).

8) mooring post

IHO Definition: A post where to which something (such as a craft) can be moored. (Adapted from Merriam-Webster Dictionary – 2023).

Remarks:

No remarks.

27.67 category of pilot boarding place (CATPIL)

IHO Definition: **CATEGORY OF PILOT BOARDING PLACE.** Classification of pilot boarding method.

Attribute Type: Enumeration**1) boarding by pilot-cruising vessel**

IHO Definition: Pilot boards from a cruising vessel. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.62, November 2000).

2) boarding by helicopter

IHO Definition: Pilot boards by helicopter which comes out from the shore. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.62, November 2000)

3) pilot comes out from shore

IHO Definition: Pilot embarks from a vessel or disembarks to a vessel which comes out from the shore on request. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.62, November 2000).

Remarks:

No remarks.

27.68 category of pipeline/pipe (CATPIP)

IHO Definition: **CATEGORY OF PIPELINE/PIPE.** Classification of a pipe systems use.

Attribute Type: Enumeration**2) outfall pipe**

IHO Definition: A pipe (generally a sewer or drainage pipe) discharging into the sea or a river. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

3) **intake pipe**

IHO Definition: A pipe taking water from a river or other body of water, to drive a mill or supply a canal, waterworks, etc. (Adapted from IHO Dictionary – S-32).

4) **sewer**

IHO Definition: A pipe in a sewage system for carrying water or sewage to a disposal area. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

5) **bubbler system**

IHO Definition: A submerged pipe from which warm water bubbles, preventing the surrounding water from freezing. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.63, November 2000).

6) **supply pipe**

IHO Definition: A pipe used for transport (supply) of gas or liquid product. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

7) **bubble curtain**

IHO Definition: A high pressure sub-surface pipeline (usually on the seafloor) with holes emitting a curtain of air bubbles. Its uses include: the prevention of acoustic transmission through the water; preventing the spread of surface debris or floating liquids; controlling the movement of fish. (IHO Chart Specifications, S-4).

Remarks:

No remarks.

27.69 category of plug

IHO Definition: The type of plug(s) available at the power supply station.

Attribute Type: Text

Remarks:

- up to 100 characters
- e.g. CEE or Powerlock

27.70 category of preference

IHO Definition: **CATEGORY OF PREFERENCE**. The selection of a first choice compared to other options.

Attribute Type: Enumeration

1) **primary**

IHO Definition: The preferred first choice used in normal conditions.

2) **alternate**

IHO Definition: The preferred choice in extraordinary conditions

Remarks:

No remarks.

27.71 category of production area (CATPRA)

IHO Definition: **CATEGORY OF PRODUCTION AREA**. Classification of an area set aside for heavy industry.

Attribute Type: Enumeration**1) quarry**

IHO Definition: An open-air excavation for the extraction of stone intended principally for use in construction. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

2) mine

IHO Definition: An excavation made in the terrain for the purpose of extracting and/or exploiting natural resources. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

3) stockpile

IHO Definition: A reserve stock of material, equipment or other supplies. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.64, November 2000).

4) power station area

IHO Definition: A facility including one or more buildings and equipment used for power generation. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

5) refinery area

IHO Definition: A facility where petroleum and/or petroleum products are refined. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

6) timber yard

IHO Definition: An open tract for the storage of wooden lumber and timbers. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

7) factory area

IHO Definition: A group of buildings where goods are manufactured. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.64, November 2000).

8) tank farm

IHO Definition: A collection of collocated large-capacity tanks in which petroleum, natural gas, or liquid petrochemicals are stored. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

9) wind farm

IHO Definition: A collection of wind turbines that are collocated and are organized as a single power generation unit. (IHO Dictionary – S-32).

10) slag heap/spoil heap

IHO Definition: Hill of refuse from a mine, industrial plant etc. on land. (Adapted from Concise Oxford Dictionary).

11) production plant

IHO Definition: A plant where production takes place.

12) solar farm

IHO Definition: A large-scale photovoltaic system (PV system) designed for the supply of merchant power into the electricity grid. They are differentiated from most building-mounted and other decentralised solar power applications because they supply power at the utility level, rather than to a local user or users. The generic expression utility-scale solar is sometimes used to describe this type of project. (Wikipedia).

Remarks:

No remarks.

27.72 category of pylon (CATPYL)

IHO Definition: **CATEGORY OF PYLON.** Classification of the pylon based on the service it is supporting.

Attribute Type: Enumeration

1) **power transmission pylon/pole**

IHO Definition: A pylon or pole that supports one or more power lines. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

2) **telephone/telegraph pylon/pole**

IHO Definition: A pylon or pole that supports one or more communication lines. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

3) **aerial cableway pylon**

IHO Definition: A tower or pylon supporting steel cables which convey cars, buckets, or other suspended carrier units. (Adapted from Defence Geospatial Information Working Group; Feature and Attribute Coding Catalogue, Edition 1.2).

4) **bridge pylon/tower**

IHO Definition: A tower and/or pylon from which the deck of a bridge is suspended. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

5) **bridge pier**

IHO Definition: A pillar or abutment that supports a bridge span. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

6) **pipeline pylon**

IHO Definition: A tower or pylon supporting a suspended pipeline or pipelines. (Adapted from Defence Geospatial Information Working Group; Feature and Attribute Coding Catalogue, Edition 1.2).

Remarks:

No remarks.

27.73 category of radar station (CATRAS)

IHO Definition: **CATEGORY OF RADAR STATION.** Classification of radar station based on the services offered.

Attribute Type: Enumeration

1) **radar surveillance station**

IHO Definition: A radar station established for traffic surveillance. (IHO Dictionary – S-32).

2) **coast radar station**

IHO Definition: A shore-based station which the mariner can contact by radio to obtain a position. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.68, November 2000).

Remarks:

No remarks.

27.74 category of radar transponder beacon (CATRTB)

IHO Definition: **CATEGORY OF RADAR TRANSPONDER BEACON.** Classification of radar transponder beacon based on functionality.

Attribute Type: Enumeration

1) **ramark, radar beacon transmitting continuously**

IHO Definition: A radar marker beacon which continuously transmits a signal appearing as a radial line on a radar screen, the line indicating the direction of the beacon. Remarks are intended primarily for marine use. The name “ramark” is derived from the words radar marker. (IHO Dictionary – S-32).

2) racon, radar transponder beacon

IHO Definition: A radar beacon which returns a coded signal which provides identification of the beacon, as well as range and bearing. The range and bearing are indicated by the location of the first character received on the radar screen. The name “racon” is derived from the words radar beacon. (IHO Dictionary – S-32).

3) leading racon/radar transponder beacon

IHO Definition: A radar beacon that may be used (in conjunction with at least one other radar beacon) to indicate a leading line. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.69, November 2000).

Remarks:

No remarks.

27.75 category of radio station (CATROS)

IHO Definition: **CATEGORY OF RADIO STATION.** Classification of radio services offered by a radio station.

Attribute Type: Enumeration

5) radio direction-finding station

IHO Definition: A radio station intended to determine only the direction of other stations by means of transmission from the latter. (IHO Dictionary – S-32).

10) differential GNSS

IHO Definition: Differential GNSS is implemented by placing a GNSS monitor receiver at a precisely known location. Instead of computing a navigation fix, the monitor determines the range error to every GNSS satellite it can track. These ranging errors are then transmitted to local users where they are applied as corrections before computing the navigation result. (Adapted from IHO Dictionary – S-32).

11) Toran

IHO Definition: An electronic position fixing system used mainly by aircraft. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.71, November 2000).

14) Chaika

IHO Definition: A low frequency electronic position fixing system using pulsed transmissions at 100 KHz. (Admiralty List of Radio Signals, UK Hydrographic Office, Volume 2, 1995).

19) radio telephone station

IHO Definition: The equipment needed at one station to carry on two way voice communication by radio waves only. (Websters New World Dictionary Third College Edition).

20) AIS base station

IHO Definition: An AIS shore station for use by competent authorities to provide AIS service, manage the data link and enable effective ship to shore / shore to ship transmission of information. (Derived from IALA Guideline G1082).

Remarks:

None.

27.76 category of refuse dump (catrfd)

IHO Definition: Category of refuse dump.

1) Cargo Residue/Slop

IHO Definition: A facility where vessels can dispose of cargo residues and/or slops.

2) Waste Oil

IHO Definition: A facility where vessels can dispose of waste oil.

3) Grey/Black Water

IHO Definition: A facility where vessels can dispose of grey and/or black waste water.

4) Domestic Refuse

IHO Definition: A facility where vessels can dispose of domestic refuse.

Remarks:

No remarks.

27.77 category of rescue station (CATRSC)

IHO Definition: **CATEGORY OF RESCUE STATION.** Classification of aid station based on life saving equipment.

Attribute Type: Enumeration

1) rescue station with lifeboat

IHO Definition: A place where equipment for saving life at sea is maintained; the type of lifeboat may vary from fast, long distance boats to inflatable inshore boats. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.74, November 2000).

2) rescue station with rocket

IHO Definition: A life saving station equipped with line-carrying rocket apparatus. (IHO Dictionary – S-32).

4) refuge for shipwrecked mariners

IHO Definition: Shelter or protection from danger or distress at sea. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.74, November 2000).

5) refuge for intertidal area walkers

IHO Definition: Shelter or protection from danger in areas exposed to extreme and sudden tides or tidal streams. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.74, November 2000).

6) lifeboat lying at a mooring

IHO Definition: A place where a lifeboat is moored ready for use. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.74, November 2000).

7) aid radio station

IHO Definition: A radio station reserved for emergency situations; might also be a public telephone. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.74, November 2000).

8) first aid equipment

IHO Definition: A place where first aid equipment is available. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.74, November 2000).

9) lifebuoy, ring buoy, life ring, life saver

IHO Definition: A "kisby ring" or "perry buoy" designed to be thrown to a person in the water, to provide buoyancy and to prevent drowning.

Remarks:

No remarks.

27.78 category of restricted area (CATREA)

IHO Definition: **CATEGORY OF RESTRICTED AREA.** The official legal status of each kind of restricted area defines the kind of restriction(s), for example the restriction for a 'game reserve' may be 'entering prohibited'.

Attribute Type: Enumeration

1) **offshore safety zone**

IHO Definition: The area around an offshore installation within which vessels are prohibited from entering without permission. Special regulations protect installations within a safety zone and vessels of all nationalities are required to respect the zone. (IHO Dictionary – S-32).

4) **nature reserve**

IHO Definition: A tract of land or water managed so as to preserve its flora, fauna, physical features, etc. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.75, November 2000, as amended).

5) **bird sanctuary**

IHO Definition: A place where birds are bred and protected. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.75, November 2000).

6) **game reserve**

IHO Definition: A place where wild animals or birds hunted for sport or food are kept undisturbed for private use. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.75, November 2000).

7) **seal sanctuary**

IHO Definition: A place where seals are protected. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.75, November 2000).

8) **degaussing range**

IHO Definition: An area, usually about two cables diameter, within which ships' magnetic fields may be measured; sensing instruments and cables are installed on the seabed in the range and there are cables leading from the range to a control position ashore. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.76, November 2000).

9) **military area**

IHO Definition: An area controlled by the military in which restrictions may apply. (Australian Hydrographic Office).

10) **historic wreck area**

IHO Definition: An area around certain wrecks of historical importance to protect the wrecks from unauthorized interference by diving, salvage or deposition (including anchoring). (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.76, November 2000).

12) **navigational aid safety zone**

IHO Definition: An area around a navigational aid which vessels are prohibited from entering. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.76, November 2000).

14) **minefield**

IHO Definition: An area laid and maintained with explosive mines for defence or practice purposes. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.76, November 2000).

18) **swimming area**

IHO Definition: An area in which people may swim and therefore vessel movement may be restricted. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.76, November 2000).

19) **waiting area**

IHO Definition: An area reserved for vessels waiting to enter a harbour. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.76, November 2000).

20) **research area**

IHO Definition: An area where marine research takes place. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.76, November 2000).

21) **dredging area**

IHO Definition: An area where dredging is taking place. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.76, November 2000).

22) fish sanctuary

IHO Definition: A place where fish (including shellfish and crustaceans) are protected. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.76, November 2000, as amended).

23) ecological reserve

IHO Definition: A tract of land or water managed so as to preserve the relation of plants and living creatures to each other and to their surroundings. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.76, November 2000, as amended).

24) no wake area

IHO Definition: An area in which a vessels' speed must be reduced in order to reduce the size of the wake it produces. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.76, November 2000).

25) swinging area

IHO Definition: An area where vessels turn. (Service Hydrographique et Océanographique de la Marine, France).

26) water skiing area

IHO Definition: An area within which people may water ski and therefore vessel movement may be restricted.

27) environmentally sensitive sea area

IHO Definition: A generic term which may be used to describe a wide range of areas, considered sensitive for a variety of environmental reasons. (IHO Chart Specifications, S-4).

28) particularly sensitive sea area

IHO Definition: An area that needs special protection through action by IMO because of its significance for regional ecological, socio-economic or scientific reasons and because it may be vulnerable to damage by international shipping activities. (IHO Chart Specifications, S-4).

29) disengagement area

IHO Definition: An area near a fairway where vessels can go to clear the way or make an about turn and possibly return to a waiting area when nautical conditions impose it.

30) port security area

IHO Definition: An area in which defence, law and treaty enforcement, and counter-terrorism activities that fall within the port and maritime domain apply. (Adapted from Wikipedia).

31) coral sanctuary

IHO Definition: A place where coral is protected.

32) recreation area

IHO Definition: An area within which recreational activities regularly take place and therefore vessel movement may be restricted. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.76, November 2000).

33) ship pollution emission control

IHO definition: An area within which the ship pollution emission is controlled.

Remarks:

- The official legal status of each kind of restricted area defines the kind of restriction(s), for example the restriction for a "game preserve" may be "entering prohibited"; the restriction for an "anchoring prohibition area" is "anchoring prohibited".

27.79 category of road (CATROD)

IHO Definition: **CATEGORY OF ROAD.** Classification of a road based on size.

Attribute Type: Enumeration

1) **motorway**

IHO Definition: A limited access dual carriageway road specially designed for fast long-distance traffic and subject to special regulations concerning its use. It may have more than two lanes. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

2) **major road**

IHO Definition: A hard surfaced (metalled) road; a main through route. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.77, November 2000).

3) **minor road**

IHO Definition: A secondary road for local traffic. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.77, November 2000).

4) **track/path**

IHO Definition: Track – a rough path or way formed by use. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

Path – a way or track laid down for walking or made by continual treading. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

5) **major street**

IHO Definition: A main road, in an urban area, for through traffic. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.77, November 2000).

6) **minor street**

IHO Definition: A secondary road, in an urban area, for local traffic. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.77, November 2000).

Remarks:

No remarks.

27.80 category of schedule

IHO Definition: **CATEGORY OF SCHEDULE.** The type of schedule, for instance opening, closure, etc.

Attribute Type: Enumeration

1) **normal operation**

IHO Definition: The service, office, is open, fully manned, and operating normally, or the area is accessible as usual.

2) **closure**

IHO Definition: The service, office, or area is closed.

3) **unmanned operation**

IHO Definition: The service is available but not manned.

Remarks:

No remarks.

27.81 category of sea area (CATSEA)

IHO Definition: **CATEGORY OF SEA AREA.** Classification of an area based on its physical characteristics.

Attribute Type: Enumeration

2) **gat**

IHO Definition: A natural or artificial passage or channel through shoals or steep banks, or across a line of banks lying between two channels. (IHO Dictionary – S-32).

3) **bank**

IHO Definition: An elevation of the seafloor, at depths generally less than 200 m, but sufficient for safe surface navigation, commonly found on the continental shelf or near an island. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, Edition 4.1.0).

4) **deep**

IHO Definition: In oceanography, an obsolete term which was generally restricted to depths greater than 6,000 m. (IHO Dictionary – S-32).

5) **bay**

IHO Definition: A wide indentation in the coastline generally smaller than a gulf and larger than a cove. For the purposes of the United Nations Convention on the Law of the Sea, a bay is a well-marked indentation whose penetration is in such proportion to the width of its mouth as to contain land locked waters and constitute more than a mere curvature of the coast. (IHO Dictionary – S-32).

6) **trench**

IHO Definition: A long, deep, asymmetrical depression with relatively steep sides, that is associated with subduction. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, Edition 4.2.0).

7) **basin**

IHO Definition: A depression of the seafloor more or less equidimensional in plan and of variable extent. (IHO Dictionary – S-32).

8) **mud flats**

IHO Definition: A level tract of land, as the bed of a dry lake or an area frequently uncovered at low tide. Usually in plural. (IHO Dictionary – S-32).

9) **reef**

IHO Definition: A shallow elevation composed of consolidated material that may constitute a hazard to surface navigation. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, Edition 4.2.0).

10) **ledge**

IHO Definition: A rocky formation continuous with and fringing the shore. (IHO Dictionary – S-32).

11) **canyon**

IHO Definition: An elongated, narrow, steep-sided depression that generally deepens down-slope. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, Edition 4.1.0).

12) **narrows**

IHO Definition: A navigable narrow part of a bay, strait, river, etc. (IHO Dictionary – S-32).

13) **shoal**

IHO Definition: A shallow elevation composed of unconsolidated material that may constitute a hazard to surface navigation. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, Edition 4.2.0).

14) **knoll**

IHO Definition: A distinct elevation with a rounded profile less than 1000m above the surrounding relief as measured from the deepest isobath that surrounds most of the feature. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, Edition 4.1.0).

15) ridge

IHO Definition: An elongated elevation of varying complexity and size, generally having steep sides. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, Edition 4.2.0).

16) seamount

IHO Definition: A distinct generally equidimensional elevation greater than 1000m above the surrounding relief as measured from the deepest isobath that surrounds most of the feature. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, Edition 4.2.0).

17) pinnacle

IHO Definition: Any high tower or spire-shaped pillar or rock or coral, alone or cresting a summit. It may extend above the surface of the water. It may or may not be a hazard to surface navigation. (IHO Dictionary – S-32).

18) abyssal plain

IHO Definition: An extensive, flat, gently sloping or nearly level region at abyssal depths. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

19) plateau

IHO Definition: A large, relatively flat elevation that is higher than the surrounding relief with one or more relatively steep sides. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, Edition 4.2.0).

20) spur

IHO Definition: A subordinate ridge protruding from a larger feature. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, Edition 4.2.0).

21) shelf

IHO Definition: The flat or gently sloping region adjacent to a continent or around an island that extends from the low water line to a depth, generally about 200m, where there is a marked increase in downward slope. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, Edition 4.2.0).

22) trough

IHO Definition: A long depression generally wide and flat bottomed with symmetrical and parallel sides. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, Edition 4.2.0).

23) saddle

IHO Definition: A broad pass or col in a ridge, rise or other elevation. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, Edition 4.2.0).

24) abyssal hill

IHO Definition: An isolated small elevation on the deep seafloor. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, Edition 4.2.0).

25) apron

IHO Definition: A gently dipping slope, with a smooth surface, commonly found around groups of islands and seamounts. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, Edition 4.1.0).

26) archipelagic apron

IHO Definition: A gentle slope with a generally smooth surface of the seafloor, characteristically found around groups of islands or seamounts. (Adapted from IHO-IOC Publication B-6, Standardization of Undersea Feature Names, Edition 4.1.0).

27) borderland

IHO Definition: A region adjacent to a continent, normally occupied by or bordering a shelf and sometimes emerging as islands, that is irregular or blocky in plan or profile, with depths well in excess of those typical of a shelf. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, Edition 4.1.0).

28) continental margin

IHO Definition: The zone, generally consisting of shelf, slope and continental rise, separating the continent from the deep seafloor or abyssal plain or plain. Occasionally a trench may be present in place of a continental rise. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, Edition 4.2.0).

29) **continental rise**

IHO Definition: A gentle slope rising from the oceanic depths towards the foot of a continental slope. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, Edition 4.1.0).

30) **escarpment**

IHO Definition: An elongated, characteristically linear, steep slope separating horizontal or gently sloping areas of the seafloor. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, Edition 4.1.0).

31) **fan**

IHO Definition: A relatively smooth, depositional feature continuously deepening away from a sediment source commonly located at the lower termination of a canyon or canyon system. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, Edition 4.1.0).

32) **fracture zone**

IHO Definition: A long narrow zone of irregular topography formed by the movement of tectonic plates associated with an offset of a spreading ridge axis, characterized by steep-sided and/or asymmetrical ridges, troughs or escarpments. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, Edition 4.1.0).

33) **gap**

IHO Definition: A narrow break in a ridge, rise or other elevation. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, Edition 4.1.0).

34) **guyot**

IHO Definition: A seamount having a comparatively smooth flat top. (IHO Dictionary – S-32 and IHO-IOC Publication B-6, Standardization of Undersea Feature Names, Edition 4.1.0).

35) **hill**

IHO Definition: A distinct elevation generally of irregular shape, less than 1000m above the surrounding relief as measured from the deepest isobath that surrounds most of the feature. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, Edition 4.1.0).

36) **hole**

IHO Definition: A depression of limited extent with all sides rising steeply from a relatively flat bottom. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, Edition 4.1.0).

37) **levee**

IHO Definition: A depositional embankment bordering a canyon, valley or sea channel. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, Edition 4.1.0).

38) **median valley**

IHO Definition: The axial depression of the mid-oceanic ridge system. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, Edition 4.1.0).

39) **moat**

IHO Definition: An annular or partially annular depression commonly located at the base of seamounts, islands and other isolated elevations. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, Edition 4.1.0).

40) **mountains**

IHO Definition: A natural elevation of the earth's surface rising more or less abruptly from the surrounding level, and attaining an altitude which, relatively to adjacent elevations, is impressive or notable. (IHO Dictionary – S-32).

41) **peak**

IHO Definition: A conical or pointed elevation on a larger feature such as a seamount. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, Edition 4.2.0).

42) **province**

IHO Definition: A geographically distinct region with a number of shared physiographic characteristics that contrast with those in the surrounding areas. This term should be modified with the generic term that best describes the majority of features in the region, for example "Seamount" in Baja California Seamount Province. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, Edition 4.2.0).

43) **rise**

IHO Definition: A broad elevation that generally rises gently and smoothly from the surrounding relief. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, Edition 4.2.0).

44) **sea channel**

IHO Definition: An elongated, meandering depression, usually occurring on a gently sloping plain or fan. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, Edition 4.2.0).

45) **seamount chain**

IHO Definition: Several seamounts in linear or arcuate alignment. (Adapted from IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

46) **shelf-edge**

IHO Definition: The line along which there is a marked increase in slope at the seaward margin of a shelf. (Adapted from IHO-IOC Publication B-6, Standardization of Undersea Feature Names, Edition 4.2.0).

47) **sill**

IHO Definition: A relatively shallow barrier between BASINS that may inhibit water movement. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, Edition 4.2.0).

48) **slope**

IHO Definition: The sloping region that deepens from a shelf to the point where there is a general decrease in gradient. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, Edition 4.2.0).

49) **terrace**

IHO Definition: A flat or gently sloping region, generally long and narrow, bounded along one edge by a steeper descending slope and along the other by a steeper ascending slope. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, Edition 4.2.0).

50) **valley**

IHO Definition: An elongated depression that generally widens and deepens down-slope. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, Edition 4.2.0).

51) **canal**

IHO Definition: An artificial waterway with no flow, or a controlled flow, used for navigation, or for draining or irrigating land (ditch). (IHO Dictionary – S-32).

52) **lake**

IHO Definition: A large body of water entirely surrounded by land. (IHO Dictionary – S-32).

53) **river**

IHO Definition: A relatively large natural stream of water. (IHO Dictionary – S-32).

54) **reach**

IHO Definition: A straight section of a river, especially a navigable river between two bends; or an arm of the sea extending into the land. (Adapted from IHO Dictionary – S-32).

55) **intertidal cay**

IHO Definition: A low, flat island of sand, coral, etc. awash or submerged at high water. (Adapted from IHO Dictionary – S-32).

56) submarine volcano

IHO Definition: A seabed volcano, submerged at the chart sounding datum, which may or may not be active. (IHO Dictionary – S-32).

57) chute

IHO Definition: An inclined plane, sloping channel, or passage down or through which things may pass.

58) backwater/slough

IHO Definition: A body of water (as an inlet or tributary) that is out of the main current of a larger body.

59) bend

IHO Definition: A curve or change in direction of a watercourse or river.

Remarks:

No remarks.

27.82 category of sensor (catsen)

IHO Definition: Category of sensor.

1) Light Activated

IHO Definition: A sensor which is activated by a spotlight.

2) Telephone Activated

IHO Definition: A sensor which is activated by telephone.

3) Radio Activated

IHO Definition: Activated by radio signal.

Remarks:

No remarks.

27.83 category of ship (excluding) (lc_cse)

IHO Definition: Excluding list of categories of ship for the applicability of a feature.

1) All Types

IHO Definition: The sum of all of the different kinds (or sorts or types) of an entity.

2) Other

IHO Definition: Being the one or ones distinct from that or those first mentioned or implied.

3) Non-Motorized Vessel

IHO Definition: A vessel that is not propelled by an internal combustion engine, such as vessels propelled by wind or manual methods such as rowing or pedalling.

5) Craft

IHO Definition: A vessel or item of **floating equipment**.

6) Vessel

IHO Definition: An **inland waterway vessel** or **sea going ship**.

7) Inland Waterway Vessel

IHO Definition: A vessel intended solely or mainly for navigation on inland waterways.

8) Sea Going Ship

IHO Definition: A vessel certificated for sea-going service.

9) Motor Vessel

IHO Definition: A **motor cargo vessel** or a **motor tanker**.

10) Motor Tanker

IHO Definition: A vessel intended for the carriage of goods in fixed tanks and built to navigate independently under its own motive power.

11) Motor Cargo Vessel

IHO Definition: A vessel, other than a motor tanker, intended for the carriage of goods and built to navigate independently under its own motive power.

12) Canal Barge

IHO Definition: An inland waterway vessel not exceeding 38.5 m in length and 5.05 m in breadth and usually operating on the Rhine-Rhone-Canal.

13) Tug

IHO Definition: A vessel specially built to perform towing operations.

14) Pusher

IHO Definition: A vessel specially built to propel a pushed convoy.

15) Barge

IHO Definition: A **dumb barge** or **tank barge**.

16) Tank Barge

IHO Definition: A vessel intended for the carriage of goods in fixed tanks and built to be towed, either having no motive power of its own or having only sufficient motive power to perform restricted manoeuvres.

17) Dumb Barge

IHO Definition: A vessel, other than a tank barge, intended for the carriage of goods and built to be towed, either having no motive power of its own or having only sufficient motive power to perform restricted manoeuvres.

18) Lighter

IHO Definition: A **tank lighter**, **cargo lighter** or **ship borne lighter**.

19) Tank Lighter

IHO Definition: A vessel intended for the carriage of goods in fixed tanks, built or specially modified to be pushed, either having no motive power of its own or having only sufficient motive power to perform restricted manoeuvres when not part of a pushed convoy.

20) Cargo Lighter

IHO Definition: A vessel, other than a tank lighter, intended for the carriage of goods and built or specially modified to be pushed, either having no motive power of its own or having only sufficient motive power to perform restricted manoeuvres when not part of a pushed convoy.

21) Ship Borne Lighter

IHO Definition: A lighter built to be carried aboard sea going ships and to navigate on inland waterways.

22) Passenger Vessel

IHO Definition: A day trip or **cabin vessel** constructed and equipped to carry more than 12 passengers.

23) Passenger Sailing Vessel

IHO Definition: A passenger vessel fitted out mainly with a view to propulsion under sail.

24) Day Trip Vessel

IHO Definition: A passenger vessel without overnight passenger cabins.

25) Cabin Vessel

IHO Definition: A passenger vessel with overnight passenger cabins.

26) High-Speed Vessel

IHO Definition: A motorized vessel capable of reaching speeds over 40km/h with respect to water.

27) Floating Equipment

IHO Definition: A floating installation carrying working gear such as cranes, dredging equipment, pile drivers or elevators.

28) Worksite Craft

IHO Definition: A vessel, appropriately built and equipped for use at worksites, such as a reclamation barge, hopper or pontoon barge, pontoon or stone-dumping vessel.

29) Recreational Craft

IHO Definition: A vessel other than a passenger vessel, intended for sport or pleasure.

30) Dinghy

IHO Definition: A boat for use in transport, rescue, salvage and work duties.

31) Floating Establishment

IHO Definition: Any floating installation not normally intended to be moved, such as a swimming bath, dock, jetty or boathouse.

32) Floating Object

IHO Definition: A raft or other structure, object or assembly capable of navigation, not being a vessel or floating equipment or establishment.

Remarks:

No remarks.

27.84 category of ship (including) (lc_csi)

IHO Definition: Including list of categories of ship for the applicability of a feature.

1) All Types

IHO Definition: The sum of all of the different kinds (or sorts or types) of an entity.

2) Other

IHO Definition: Being the one or ones distinct from that or those first mentioned or implied.

3) Non-Motorized Vessel

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30) Dinghy

IHO Definition: A boat for use in transport, rescue, salvage and work duties.

31) Floating Establishment

IHO Definition: Any floating installation not normally intended to be moved, such as a swimming bath, dock, jetty or boathouse.

32) Floating Object

IHO Definition: A raft or other structure, object or assembly capable of navigation, not being a vessel or floating equipment or establishment.

Remarks:

No remarks.

27.85 category of shoreline construction (CATSLC)

IHO Definition: **CATEGORY OF SHORELINE CONSTRUCTION.** Classification of shoreline construction based on use.

Attribute Type: Enumeration

1) **breakwater**

IHO Definition: A structure protecting a shore area, harbour, anchorage, or basin from waves. (IHO Dictionary – S-32).

2) **groyne**

IHO Definition: A low artificial wall-like structure of durable material extending from the land to seaward for a particular purpose, such as to protect the coast or to force a current to scour a channel. (IHO Dictionary – S-32).

3) **mole**

IHO Definition: A form of breakwater alongside which vessels may lie on the sheltered side only; in some cases it may lie entirely within an artificial harbour, permitting vessels to lie along both sides. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.84, November 2000).

4) **pier (jetty)**

IHO Definition: A long, narrow structure extending into the water to afford a berthing place for vessels, to serve as a promenade, etc. (IHO Dictionary – S-32).

5) **promenade pier**

IHO Definition: A pier built only for recreational purposes. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.84, November 2000).

6) **wharf**

IHO Definition: A structure serving as a berthing place for vessels. (IHO Dictionary – S-32).

7) **training wall**

IHO Definition: A wall or bank, often submerged, built to direct or confine the flow of a river or tidal current, or to promote a scour action. (Adapted from IHO Dictionary – S-32 and IHO Chart Specifications, S-4).

8) **rip rap**

IHO Definition: A layer of broken rock, cobbles, boulders, or fragments of sufficient size to resist the erosive forces of flowing water and wave action. (Adapted from Marine Chart Manual, US National Oceanic and Atmospheric Administration – NOAA, 1992).

9) **revetment**

IHO Definition: Facing of stone or other material, either permanent or temporary, placed along the edge of a stream, river or canal to stabilize the bank and to protect it from the erosive action of the stream. (Adapted from IHO Dictionary – S-32).

10) **sea wall**

IHO Definition: An embankment or wall for protection against waves or tidal action along a shore or water front. (IHO Dictionary – S-32).

11) **landing steps**

IHO Definition: Steps at the shoreline as the connection between land and water on different levels. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

12) **ramp**

IHO Definition: A sloping structure which may include rails that can either be used, as a landing place, at variable water levels, for small vessels, landing ships, or a ferry boat, or for hauling a cradle carrying a vessel. (Adapted from IHO Dictionary – S-32).

13) **slipway**

IHO Definition: The prepared and usually reinforced inclined surface on which keel- and bilge-blocks are laid for supporting a vessel under construction. (IHO Dictionary – S-32).

14) **fender**

IHO Definition: A protective structure designed to cushion the impact of a vessel and prevent damage. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

15) **solid face wharf**

IHO Definition: A wharf consisting of a solid wall of concrete, masonry, wood etc., such that the water cannot circulate freely under the wharf. The type of construction affects ship-handling; for example, a solid face wharf may give shelter from tidal streams, but under certain circumstances a cushion of water may build up between such a wharf and a ship attempting to berth at it, causing difficulties in ship handling. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.85, November 2000).

16) **open face wharf**

IHO Definition: A wharf supported on piles or other structures which allow free circulation of water under the wharf. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.85, November 2000).

17) **log ramp**

IHO Definition: An inclined plane used to dump logs into the water for transport, or to haul logs out of the water for processing. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

18) **lock/guide wall**

IHO Definition: Permanent structure bounding a lock and including guide walls. (Electronic Chart Display and Information System for Inland Navigation, Section 2: Data Standard, Appendix A: Object Catalogue for Inland ECDIS)

19) ice breaker

IHO Definition: An often wedge-like structure used for protecting a bridge pier, dock, facility, etc. from floating ice or other debris. (Electronic Chart Display and Information System for Inland Navigation, Section 2: Data Standard, Appendix A: Object Catalogue for Inland ECDIS)

20) swimming facility

IHO Definition: An artificial pool or swimming enclosure, especially one in the open air, which may be constructed of wire mesh or heavy netting supported by cables, buoys or piles, for swimming in. (Adapted from the Macquarie Concise Dictionary).

21) water intake structure

IHO Definition: A structure designed to divert water from a river or channel for the purpose of water supply, hydroelectric power or irrigation. (Electronic Chart Display and Information System for Inland Navigation, Section 2: Data Standard, Appendix A: Object Catalogue for Inland ECDIS)

22) quay

IHO Definition: A wharf approximately parallel to the shoreline and accommodating ships on one side only, the other side being attached to the shore. It is usually of solid construction, as contrasted with the open pile construction usually used for piers. (IHO Dictionary – S-32).

23) tie-up wall

IHO Definition: A section of wall designated for tying-up vessels awaiting transit. Bollards and mooring devices are available for both large and small ships. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

Remarks:

No remarks.

27.86 category of signal station, traffic (CATSIT)

IHO Definition: **CATEGORY OF SIGNAL STATION, TRAFFIC.** Classification of station based on the traffic service provided.

Attribute Type: Enumeration

1) port control

IHO Definition: A signal station for the control of vessels within a port. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.86, November 2000).

2) port entry and departure

IHO Definition: A signal station for the control of vessels entering or leaving a port. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.86, November 2000).

3) international port traffic

IHO Definition: A signal station displaying International Port Traffic signals. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.86, November 2000).

4) berthing signal station

IHO Definition: A signal station for the control of vessels when berthing. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.86, November 2000).

5) dock

IHO Definition: A signal station for the control of vessels entering or leaving a dock. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.86, November 2000).

6) lock

IHO Definition: A signal station for the control of vessels entering or leaving a lock. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.86, November 2000).

7) flood barrage station

IHO Definition: A signal station for the control of vessels wishing to pass through a flood control barrage. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.86, November 2000).

8) bridge passage

IHO Definition: A signal station for the control of vessels wishing to pass under a bridge. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.86, November 2000).

9) dredging

IHO Definition: A signal station indicating when dredging is in progress. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.86, November 2000).

10) traffic control light

IHO Definition: Visual signal lights placed in a waterway to indicate to shipping the movements authorized at the time at which they are shown. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.86, November 2000).

Remarks:

No remarks.

27.87 category of signal station, warning (CATSIW)

IHO Definition: **CATEGORY OF SIGNAL STATION, WARNING.** Classification of station based on the warning service provided.

Attribute Type: Enumeration**1) danger**

IHO Definition: A signal or message warning of the presence of a danger to navigation. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.87, November 2000).

2) maritime obstruction

IHO Definition: A signal or message warning of the presence of a maritime obstruction. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.87, November 2000).

3) cable

IHO Definition: A signal or message warning of the presence of a cable. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.87, November 2000).

4) military practice

IHO Definition: A signal or message warning of activity in a military practice area. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.87, November 2000).

5) distress

IHO Definition: A station that may receive or transmit distress signals. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.87, November 2000).

6) weather

IHO Definition: A visual signal displayed to indicate a weather forecast. (IHO Dictionary – S-32).

7) storm

IHO Definition: A signal or message conveying information about storm conditions. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.87, November 2000).

8) ice warning

IHO Definition: A signal or message conveying information about ice conditions. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.87, November 2000).

9) **time**

IHO Definition: An accurate signal marking a specified time or time interval. It is used primarily for determining errors of timepieces. Such signals are usually sent from an observatory by radio, but visual signals are used at some ports. (IHO Dictionary – S-32).

10) **tide**

IHO Definition: A signal or message conveying information on tidal conditions in the area in question. (IHO Dictionary – S-32).

11) **tidal stream**

IHO Definition: A signal or message conveying information on condition of tidal currents in the area in question. (IHO Dictionary – S-32).

12) **tide gauge**

IHO Definition: A device for measuring the height of tide. A graduated staff in a sheltered area where visual observations can be made; or it may consist of an elaborate recording instrument making a continuous graphic record of tide height against time. Such an instrument is usually actuated by a float in a pipe communicating with the sea through a small hole which filters out shorter waves. (IHO Dictionary – S-32).

13) **tide scale**

IHO Definition: A visual scale which directly shows the height of the water above chart datum or a local datum. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.88, November 2000).

14) **diving**

IHO Definition: A signal or message warning of diving activity. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.88, November 2000).

15) **water level gauge**

IHO Definition: A device for measuring and conveying information about the water level (non-tidal) in the area in question. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.88, November 2000).

16) **vertical clearance indication**

IHO Definition: An indication of the vertical clearance of a bridge, overhead cable, etc. (Electronic Chart Display and Information System for Inland Navigation, Section 2: Data Standard, Appendix A: Object Catalogue for Inland ECDIS)

18) **depth indication**

IHO Definition: An indication of the local depth. (Electronic Chart Display and Information System for Inland Navigation, Section 2: Data Standard, Appendix A: Object Catalogue for Inland ECDIS)

Remarks:

No remarks.

27.88 category of silo/tank (CATSIL)

IHO Definition: **CATEGORY OF SILO/TANK.** Classification based on the product for which a silo or tank is used.

Attribute Type: Enumeration

1) **silo in general**

IHO Definition: A large storage structure used for storing loose materials. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

2) **tank in general**

IHO Definition: A fixed structure for storing liquids. (IHO Dictionary – S-32).

3) grain elevator

IHO Definition: A storage building for grain. Usually a tall frame, metal or concrete structure with an especially compartmented interior. (The New Encyclopaedia Britannica Micropaedia, 15th Edition).

4) water tower

IHO Definition: A tower supporting an elevated storage tank of water. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

Remarks:

No remarks.

27.89 category of slope (CATSLO)

IHO Definition: **CATEGORY OF SLOPE.** Classification of a stretch of ground forming a natural or artificial incline.

Attribute Type: Enumeration

1) cutting

IHO Definition: An excavation through high ground for a road, canal, etc. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.90, November 2000).

2) embankment

IHO Definition: A man-made raised long mound of earth or other material. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

3) dune

IHO Definition: A mound, ridge or hill of drifted material on the sea coast or in a desert. (Adapted from IHO Dictionary – S-32).

4) hill

IHO Definition: A small isolated elevation, smaller than a mountain. (IHO Dictionary – S-32).

5) pingo

IHO Definition: A dome-shaped hill formed in a permafrost area when the hydrostatic pressure of freezing ground water causes the upheaval of a layer of frozen ground. (Encyclopaedia Britannica Mycropaedia, 15th Edition).

6) cliff

IHO Definition: Land rising abruptly for a considerable distance above the water or surrounding land. (IHO Dictionary – S-32).

7) scree

IHO Definition: A mass of detritus, forming a precipitous, strong slope upon a mountain-side. Also the material composing such a slope. (IHO Dictionary – S-32).

Remarks:

No remarks.

27.90 category of small craft facility (CATSCF)

IHO Definition: **CATEGORY OF SMALL CRAFT FACILITY.** Classification of services and facilities for the small craft user.

Attribute Type: Enumeration

1) visitors berth

IHO Definition: A berth set aside for the use of visiting vessels. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.91, November 2000).

2) nautical club

IHO Definition: A club for mariners generally associated with other small craft facilities. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.91, November 2000).

3) boat hoist

IHO Definition: A hoist for lifting boats out of the water. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.91, November 2000).

4) sailmaker

IHO Definition: A place where sails are made or may be taken for repair. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.91, November 2000).

5) boatyard

IHO Definition: A place on shore where boats may be built, stored and repaired. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

6) public inn

IHO Definition: A public house providing food, drink and accommodation. (The Collins Reference English Dictionary, 1992).

7) restaurant

IHO Definition: A commercial establishment serving food. (The Collins Reference Dictionary, 1992).

8) chandler

IHO Definition: A dealer in ships' supplies. (The Collins Reference Dictionary, 1992).

9) provisions

IHO Definition: A place where food and other such supplies are available. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

10) doctor

IHO Definition: A place where a doctor is available to provide medical attention. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

11) pharmacy

IHO Definition: A place where medical drugs are dispensed. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

12) water tap

IHO Definition: A place where fresh water is available. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

13) fuel station

IHO Definition: A place where fuel is available. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

14) electricity outlet

IHO Definition: A place where a connection to an electrical supply is available. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

15) bottle gas

IHO Definition: A place where bottled gas is available. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

16) showers

IHO Definition: A place where showers are available. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

17) launderette

IHO Definition: A place where there are facilities for washing clothes. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

18) public toilets

IHO Definition: A place where toilets are available for public use. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

19) post box

IHO Definition: A place where mail may be posted. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

20) public telephone

IHO Definition: A place where a telephone is available for public use. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

21) refuse bin

IHO Definition: A place where refuse may be dumped. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

22) car park

IHO Definition: A place where cars may be parked. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

23) parking for boats and trailers

IHO Definition: A place on shore where boats and/or trailers may be parked. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

24) caravan site

IHO Definition: A place where caravans may be parked or where caravan accommodation is provided. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

25) camping site

IHO Definition: A place where visitors may pitch tents and camp. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

26) sewage pump-out station

IHO Definition: A place where sewage may be pumped off a vessel. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

27) emergency telephone

IHO Definition: A place where a telephone is available for emergency use only. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

28) landing/launching place for boats

IHO Definition: A place where boats may be landed or launched. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

29) visitors mooring

IHO Definition: A mooring set aside for the use of visiting vessels. (IHO Transfer Standard for Digital Hydrographic Data, Appendix A: Object Catalogue - Description of the Feature Coding Schema to be Used for Hydrographic Requirements)

30) scrubbing berth

IHO Definition: A place where vessels may berth for the purpose of careening. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

31) picnic area

IHO Definition: A place where people may go to eat a picnic. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

32) mechanics workshop

IHO Definition: A place where mechanical repairs can be undertaken to engines or other vessel equipment. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

33) guard and/or security service

IHO Definition: A place where a vessel is patrolled by a security service or stored in a secure lockup. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

Remarks:

No remarks.

27.91 category of special purpose mark (CATSPM)

IHO Definition: **CATEGORY OF SPECIAL PURPOSE MARK.** Classification of an aid to navigation which signifies some special purpose.

Attribute Type: Enumeration

1) firing danger mark

IHO Definition: A mark used to indicate a firing danger area, usually at sea. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.94, November 2000).

2) target mark

IHO Definition: Any object toward which something is directed. The distinctive marking or instrumentation of a ground point to aid its identification on a photograph. (Adapted from IHO Dictionary – S-32).

3) marker ship mark

IHO Definition: A mark marking the position of a ship which is used as a target during some military exercise. (Bundesamt für Seeschifffahrt und Hydrographie, Germany).

4) degaussing range mark

IHO Definition: A mark used to indicate a degaussing range. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.94, November 2000).

5) barge mark

IHO Definition: A mark of relevance to barges. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.94, November 2000).

6) cable mark

IHO Definition: A mark used to indicate the position of submarine cables or the point at which they run on to the land. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.94, November 2000).

7) spoil ground mark

IHO Definition: A mark used to indicate the limit of a spoil ground. (Adapted from IHO Dictionary – S-32).

8) outfall mark

IHO Definition: A mark used to indicate the position of an outfall or the point at which it leaves the land. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.94, November 2000).

9) ODAS

IHO Definition: Ocean Data Acquisition System. (IHO Dictionary – S-32).

10) recording mark

IHO Definition: A mark used to record data for scientific purposes. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.94, November 2000).

11) seaplane anchorage mark

IHO Definition: A mark used to indicate a seaplane anchorage. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.94, November 2000).

12) recreation zone mark

IHO Definition: A mark used to indicate a recreation zone. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.94, November 2000).

13) private mark

IHO Definition: A privately maintained mark. (IHO Transfer Standard for Digital Hydrographic Data, Appendix A: Object Catalogue - Description of the Feature Coding Schema to be Used for Hydrographic Requirements)

14) mooring mark

IHO Definition: A mark indicating a mooring or moorings. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.94, November 2000).

15) LANBY

IHO Definition: A large buoy designed to take the place of a lightship where construction of an offshore light station is not feasible. (IHO Dictionary – S-32).

16) leading mark

IHO Definition: Aids to navigation or other indicators so located as to indicate the path to be followed. Leading marks identify a leading line when they are in transit. (IHO Dictionary – S-32).

17) measured distance mark

IHO Definition: A mark forming part of a transit indicating one end of a measured distance. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.94, November 2000).

18) notice mark

IHO Definition: A notice board or sign indicating information to the mariner. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.94, November 2000).

19) TSS Mark

IHO Definition: A mark indicating a Traffic Separation Scheme. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.94, November 2000).

20) anchoring prohibited mark

IHO Definition: A mark indicating an anchoring prohibited area. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

21) berthing prohibited mark

IHO Definition: A mark indicating that berthing is prohibited. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

22) overtaking prohibited mark

IHO Definition: A mark indicating that overtaking is prohibited. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

23) two-way traffic prohibited mark

IHO Definition: A mark indicating a one-way route. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

24) reduced wake mark

IHO Definition: A mark indicating that vessels must not generate excessive wake. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

25) speed limit mark

IHO Definition: A mark indicating that a speed limit applies. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

26) stop mark

IHO Definition: A mark indicating the place where the bow of a ship must stop when traffic lights show red. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

27) general warning mark

IHO Definition: A mark indicating that special caution must be exercised in the vicinity of the mark. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

28) sound ship's siren mark

IHO Definition: A mark indicating that a ship should sound its siren or horn. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

29) restricted vertical clearance mark

IHO Definition: A mark indicating the minimum vertical space available for passage. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

30) maximum vessel's draught mark

IHO Definition: A mark indicating the maximum draught of vessel permitted. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

31) restricted horizontal clearance mark

IHO Definition: A mark indicating the minimum horizontal space available for passage. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

32) strong current warning mark

IHO Definition: A mark warning of strong currents. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

33) berthing permitted mark

IHO Definition: A mark indicating that berthing is allowed. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

34) overhead power cable mark

IHO Definition: A mark indicating an overhead power cable. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

35) channel edge gradient mark

IHO Definition: A mark indicating the gradient of the slope of a dredge channel edge. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

36) telephone mark

IHO Definition: A mark indicating the presence of a telephone. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

37) ferry crossing mark

IHO Definition: A mark indicating that a ferry route crosses the ship route; often used with a ‘sound ship's siren’ mark. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

39) pipeline mark

IHO Definition: A mark used to indicate the position of submarine pipelines or the point at which they run on to the land. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

40) anchorage mark

IHO Definition: A mark indicating an anchorage area. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

41) clearing mark

IHO Definition: A mark used to indicate a clearing line. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

42) control mark

IHO Definition: A mark indicating the location at which a restriction or requirement exists. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.96, November 2000).

43) diving mark

IHO Definition: A mark indicating that diving may take place in the vicinity. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.96, November 2000).

44) refuge beacon

IHO Definition: A mark providing or indicating a place of safety. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

45) foul ground mark

IHO Definition: A mark indicating a foul ground. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.96, November 2000).

46) yachting mark

IHO Definition: A mark installed for use by yachtsmen. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.96, November 2000).

47) heliport mark

IHO Definition: A mark indicating an area where helicopters may land. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.96, November 2000).

48) GNSS mark

IHO Definition: A mark indicating a location at which a GNSS position has been accurately determined. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.96, November 2000).

49) seaplane landing mark

IHO Definition: A mark indicating an area where seaplanes land. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.96, November 2000).

50) entry prohibited mark

IHO Definition: A mark indicating that entry is prohibited. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.96, November 2000).

51) work in progress mark

IHO Definition: A mark indicating that work (generally construction) is in progress. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.96, November 2000).

52) mark with unknown purpose

IHO Definition: A mark whose detailed characteristics are unknown. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.96, November 2000).

53) wellhead mark

IHO Definition: A mark indicating a borehole that produces or is capable of producing oil or natural gas. (Adapted from IHO Dictionary – S-32).

54) channel separation mark

IHO Definition: A mark indicating the point at which a channel divides separately into two channels. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.96, November 2000).

55) marine farm mark

IHO Definition: A mark indicating the existence of a fish, mussel, oyster or pearl farm/culture. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.96, November 2000).

56) artificial reef mark

IHO Definition: A mark indicating the existence or the extent of an artificial reef. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.96, November 2000).

57) ice mark

IHO Definition: A mark, used year round, that may be submerged when ice passes through the area.

58) nature reserve mark

IHO Definition: A mark used to define the boundary of a nature reserve.

59) fish aggregating device

IHO Definition: A fish aggregating (or aggregation) device (FAD) is a man-made object used to attract ocean going pelagic fish such as marlin, tuna and mahi-mahi (dolphin fish). They usually consist of buoys or floats tethered to the ocean floor with concrete blocks or adrift. (Wikipedia, 2017).

60) wreck mark

IHO Definition: A mark used to indicate the existence of a wreck.

61) customs mark

IHO Definition: A mark used to indicate the existence of a customs checkpoint.

62) causeway mark

IHO Definition: A mark used to indicate the existence of a causeway.

63) wave recorder

IHO Definition: A surface following buoy used to measure wave activity.

Remarks:

- A mark may be a beacon, a buoy, a signpost or may take another form.

27.92 category of structure

IHO Definition: **CATEGORY OF STRUCTURE.** Classification of a covered or partially covered area where different use types of vessel can berth.

Attribute Type: Enumeration

boathouse

IHO Definition: A building or shed, usually built partly over water, for sheltering a boat or boats.

covered bulk terminal

IHO Definition: A covered or partially covered terminal for the handling of bulk materials such as iron ore, coal, etc. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.38, November 2000).

covered wharf

IHO Definition: A covered or partially covered structure serving as a berthing place for vessels. (Adapted from IHO Dictionary – S-32).

covered service terminal

IHO Definition: A covered or partially covered terminal within which the floating equipment (dredges, tugs ...) of harbour services are berthed and serviced.

covered passenger terminal

IHO Definition: A covered or partially covered terminal for the loading and unloading of passengers. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.38, November 2000).

Remarks:

No remarks.

27.93 category of tidal stream (CAT_TS)

IHO Definition: **CATEGORY OF TIDAL STREAM.** Classification of the alternating horizontal movement of water associated with the rise and fall of the tide caused by tide producing forces.

Attribute Type: Enumeration

1) **flood stream**

IHO Definition: The horizontal movement of water associated with the rising tide. Flood streams generally set towards the shore, or in the direction of the tide progression. (Adapted from IHO Dictionary – S-32).

2) **ebb stream**

IHO Definition: The horizontal movement of water associated with falling tide. Ebb streams generally set seaward, or in the opposite direction to the tide progression. (IHO Dictionary – S-32).

3) **other tidal flow**

IHO Definition: Any other horizontal movement of water associated with tides, for example rotary flow. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.97, November 2000).

Remarks:

No remarks.

27.94 category of time and behaviour (cattab)

IHO Definition: Category of time and behaviour.

1) **Operational Period**

IHO Definition: Being in a position or adjustment to permit passage or to perform an operation.

2) **Non-Operational Period**

IHO Definition: Being in a position or adjustment to prevent passage.

Remarks:

No remarks.

27.95 category of vegetation (CATVEG)

IHO Definition: **CATEGORY OF VEGETATION.** Classification of the plant life of an area or region.

Attribute Type: Enumeration

3) **bush**

IHO Definition: A shrub or clump of shrubs with stems of moderate length. (The Concise Oxford Dictionary).

4) **deciduous wood**

IHO Definition: A wood with trees that shed their leaves annually. (Bundesamt für Seeschifffahrt und Hydrographie, Germany).

5) **coniferous wood**

IHO Definition: A wood with evergreen trees of a group usually bearing cones, including yews, cedars and redwoods. (Bundesamt für Seeschiffahrt und Hydrographie, Germany).

6) wood in general (inc mixed wood)

IHO Definition: Growing trees densely occupying a tract of land. (The Concise Oxford Dictionary).

11) reed

IHO Definition: Any of various water or marsh plants with a firm stem. (The Concise Oxford Dictionary).

13) tree in general

IHO Definition: An individual woody perennial plant, typically having a single stem or trunk growing to a considerable height and bearing lateral branches at some distance from the ground. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

14) evergreen tree

IHO Definition: Having green foliage all the year round. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

15) coniferous tree

IHO Definition: A cone-bearing, needle-leaved or scale-leaved evergreen tree. (Adapted from The New Encyclopaedia Britannica, 15th Edition 1991).

16) palm tree

IHO Definition: A tropical or sub-tropical tree, shrub or vine having a tall, unbranched, columnar trunk. The trunk is crowned by a tuft or large, pleated fan or feather shaped leaves with stout sheathing and often prickly petioles (stalks), the persistent bases of which frequently clothe the trunk. (Adapted from The New Encyclopedia Britannica, 15th Edition 1991).

17) nipa palm tree

IHO Definition: A rare palm tree with regular branching involving equal or sub-equal division of the apex that results in forking. (Adapted from The New Encyclopedia Britannica, 15th Edition 1991).

18) casuarina tree

IHO Definition: A tree characterized by slender, green, often drooping branches that are deeply grooved and that bear, at intervals, whorls of fine leaves. (Adapted from The New Encyclopedia Britannica, 15th Edition 1991).

19) eucalypt tree

IHO Definition: An instance of a large genus of mostly very large trees (90 metres). (Adapted from The New Encyclopaedia Britannica, 15th Edition 1991).

20) deciduous tree

IHO Definition: Sheds its leaves each year at the end of the period of growth. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

22) filao tree

IHO Definition: Casuarina equisetifolia, the most widespread and well-known member of the family Casuarinaceae. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

Remarks:

No remarks.

27.96 category of vehicle transfer (catvtr)

IHO Definition: Category of vehicle transfer.

1) Official

IHO Definition: Of or relating to an office or a post of authority.

2) Private

IHO Definition: Administered by an individual or corporation, rather than a State or a public body.

3) Suitable for Car Cranes

IHO Definition: Vehicle transfer location is suitable for car cranes.

4) Suitable for Car Planks

IHO Definition: Vehicle transfer location is suitable for car planks.

5) Permission Required

IHO Definition: The transfer of a vehicle requires permission.

6) Locked Gate

IHO Definition: The access to the public road is locked.

Remarks:

No remarks.

27.97 category of voltage (catvol)

IHO Definition: The electrical voltage provided by the power supply station.

1) 230V

IHO Definition: 230 Volts

2) 400V

IHO Definition: 400 Volts.

Remarks:

No remarks.

27.98 category of water turbulence (CATWAT)

IHO Definition: **CATEGORY OF WATER TURBULENCE.** Classification of an unstable sea state.

Attribute Type: Enumeration

1) breakers

IHO Definition: A wave breaking on the shore, over a reef, etc. Breakers may be roughly classified into three kinds, although the categories may overlap: spilling breakers break gradually over a considerable distance; plunging breakers tend to curl over and break with a crash; and surging breakers peak up, but then instead of spilling or plunging they surge up on the beach face. The French word “brisant” is also used for the obstacle causing the breaking of the wave. (IHO Dictionary – S-32).

2) eddies

IHO Definition: Circular movements of water usually formed where currents pass obstructions, between two adjacent currents flowing counter to each other, or along the edge of a permanent current. (IHO Dictionary – S-32).

3) overfalls

IHO Definition: Short, breaking waves occurring when a strong current passes over a shoal or other submarine obstruction or meets a contrary current or wind. (IHO Dictionary – S-32).

4) tide rips

IHO Definition: Small waves formed on the surface of water by the meeting of opposing tidal currents or by a tidal current crossing an irregular bottom. Vertical oscillation, rather than progressive waves, is characteristic of tide rips. (IHO Dictionary – S-32).

5) **bombora**

IHO Definition: A wave that forms over a submerged offshore reef or rock, sometimes (in very calm weather or at high tide) nearly swelling but in other conditions breaking heavily and producing a dangerous stretch of broken water; the reef or rock itself. (Australian National Dictionary).

6) **under water turbulence**

IHO Definition: An under water turbulence. (Inland ENC Harmonization Group)

Remarks:

No remarks.

27.99 category of waterway gauge (catgag)

IHO Definition: Category of waterway gauge.

1) **Water Level Staff / Pole**

IHO Definition: Level indicator consisting of a calibrated staff/pole and the associated bench mark.

2) **Recording Water Level Gauge**

IHO Definition: Analog or digital water level measuring and recording device.

3) **Recording Water Level Gauge With Remote Access**

IHO Definition: Recording water level gauge providing information remotely by any method.

4) **Recording Water Level Gauge With External Indicator**

IHO Definition: Recording gauge providing information of the water level via a large external indicator.

5) **Recording Water Level Gauge With Remote Access and Remote Indicator**

IHO Definition: Recording gauge providing information remotely by any method and providing information of the water level via a large external indicator.

Remarks:

No remarks.

27.100 category of weed/kelp (CATWED)

IHO Definition: **CATEGORY OF WEED/KELP.** Classification of marine vegetation of the algae class.

Attribute Type: Enumeration

1) **kelp**

IHO Definition: A giant plant sometimes 60 metres long with no roots, it is anchored by hold-fasts or tendrils up to 10 metres long, that cling to rock. Gas filled bubbles on fronds act as floats keeping the kelp just below the surface. (Earth Sciences References; Mary McNeil).

2) **seaweed**

IHO Definition: The general name for marine plants of the algae class which grow in long narrow ribbons. (International Maritime Dictionary, 2nd Edition).

4) **sargasso**

IHO Definition: A certain type of seaweed, or more generally, a large floating mass of this seaweed. (IHO Dictionary – S-32).

Remarks:
No remarks.

27.101 category of wreck (CATWRK)

IHO Definition: **CATEGORY OF WRECK.** Classification of a wrecked or ruined ship.

Attribute Type: Enumeration

1) **non-dangerous wreck**

IHO Definition: A wreck which is not considered to be dangerous to surface navigation. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.105, November 2000).

2) **dangerous wreck**

IHO Definition: A wreck submerged at such a depth as to be considered dangerous to surface navigation. (IHO Dictionary – S-32).

3) **distributed remains of wreck**

IHO Definition: A substantively decayed wreck over which it is safe to navigate but which should be avoided for anchoring, taking the ground or ground fishing. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.105, November 2000).

4) **wreck showing mast/masts**

IHO Definition: Wreck of which only the mast(s) is visible at the sounding datum indicated. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.105, November 2000).

5) **wreck showing any portion of hull or superstructure**

IHO Definition: Wreck of which any portion of the hull or superstructure is visible at the sounding datum indicated. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.105, November 2000).

Remarks:

No remarks.

27.102 category of zone of confidence in data (CATZOC)

IHO Definition: **CATEGORY OF ZONE OF CONFIDENCE IN DATA.** Classification of the zone of confidence in data within an area based on the positional accuracy, survey equipment and coverage.

Attribute Type: Enumeration

1) **zone of confidence A1**

IHO Definition: Positional Accuracy +/- 5 metres + 5% depth; Depth Accuracy 0.5 metre + 1% depth; Full area search undertaken. Significant seafloor features detected and depths measured; Controlled, systematic survey, high position and depth accuracy achieved using DGPS or a minimum three high quality lines of position (LOP) and a multibeam, channel or mechanical sweep system. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.107, November 2000).

2) **zone of confidence A2**

IHO Definition: Positional Accuracy +/- 20 metres; Depth Accuracy 1.0 metre + 2% depth; Full area search undertaken. Significant seafloor features detected and depths measured; Controlled, systematic survey achieving position and depth accuracy less than ZOC A1 and using a modern survey echosounder and a sonar or mechanical sweep system. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.107, November 2000).

3) **zone of confidence B**

IHO Definition: Positional Accuracy +/- 50 metres; Depth Accuracy 1.0 metre + 2% depth; Full area search not achieved, uncharted features hazardous to surface navigation are not expected but may exist; Controlled, systematic survey achieving similar depth but lesser position accuracies than ZOCA2, using a

modern survey echosounder, but no sonar or mechanical sweep system. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.107, November 2000).

4) zone of confidence C

IHO Definition: Positional Accuracy +/- 500 metres; Depth Accuracy 2.0 metre + 5% depth; Full area search not achieved, depth anomalies may be expected; Low accuracy survey or data collected on an opportunity basis such as soundings on passage. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.107, November 2000).

5) zone of confidence D

IHO Definition: Positional Accuracy worse than ZOC C; Depth Accuracy worse than ZOC C; Full area search not achieved, large depth anomalies may be expected; Poor quality data or data that cannot be quality assessed due to lack of information. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.107, November 2000).

6) zone of confidence U

IHO Definition: The quality of the bathymetric data has yet to be assessed. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.107, November 2000).

Remarks:

- The full categorisation of each category is as follows:

1	2	3	4	5										
ZOC 1	Position Accuracy ²	Depth Accuracy ³	Seafloor Coverage	Typical Survey Characteristics ⁵										
A1	$\pm 5 \text{ m} + 5\% \text{ depth}$	$= 0.50 + 1\%d$ <table border="1"> <thead> <tr> <th>Depth (m)</th> <th>Accuracy (m)</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>± 0.6</td> </tr> <tr> <td>30</td> <td>± 0.8</td> </tr> <tr> <td>100</td> <td>± 1.5</td> </tr> <tr> <td>1000</td> <td>± 10.5</td> </tr> </tbody> </table>	Depth (m)	Accuracy (m)	10	± 0.6	30	± 0.8	100	± 1.5	1000	± 10.5	Full area search undertaken. Significant seafloor features detected ⁴ and depths measured.	Controlled, systematic survey ⁶ high position and depth accuracy achieved using DGPS or a minimum three high quality lines of position (LOP) and a multi beam, channel or mechanical sweep system.
Depth (m)	Accuracy (m)													
10	± 0.6													
30	± 0.8													
100	± 1.5													
1000	± 10.5													
A2	$\pm 20 \text{ m}$	$= 1.00 + 2\%d$ <table border="1"> <thead> <tr> <th>Depth (m)</th> <th>Accuracy (m)</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>± 1.2</td> </tr> <tr> <td>30</td> <td>± 1.6</td> </tr> <tr> <td>100</td> <td>± 3.0</td> </tr> <tr> <td>1000</td> <td>± 21.0</td> </tr> </tbody> </table>	Depth (m)	Accuracy (m)	10	± 1.2	30	± 1.6	100	± 3.0	1000	± 21.0	Full area search undertaken. Significant seafloor features detected ⁴ and depths measured.	Controlled, systematic survey ⁶ achieving position and depth accuracy less than zone of confidence A1 and using a modern survey echo sounder ⁷ and a sonar or mechanical sweep system.
Depth (m)	Accuracy (m)													
10	± 1.2													
30	± 1.6													
100	± 3.0													
1000	± 21.0													
B	$\pm 50 \text{ m}$	$= 1.00 + 2\%d$ <table border="1"> <thead> <tr> <th>Depth (m)</th> <th>Accuracy (m)</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>± 1.2</td> </tr> <tr> <td>30</td> <td>± 1.6</td> </tr> <tr> <td>100</td> <td>± 3.0</td> </tr> <tr> <td>1000</td> <td>± 21.0</td> </tr> </tbody> </table>	Depth (m)	Accuracy (m)	10	± 1.2	30	± 1.6	100	± 3.0	1000	± 21.0	Full area search not achieved; uncharted features, hazardous to surface navigation are not expected but may exist.	Controlled, systematic survey achieving similar depth but lesser position accuracies than zone of confidence A2 , using a modern survey echo sounder ⁷ , but no sonar or mechanical sweep system.
Depth (m)	Accuracy (m)													
10	± 1.2													
30	± 1.6													
100	± 3.0													
1000	± 21.0													
C	$\pm 500 \text{ m}$	$= 2.00 + 5\%d$ <table border="1"> <thead> <tr> <th>Depth (m)</th> <th>Accuracy (m)</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>± 2.5</td> </tr> <tr> <td>30</td> <td>± 3.5</td> </tr> <tr> <td>100</td> <td>± 7.0</td> </tr> <tr> <td>1000</td> <td>± 52.0</td> </tr> </tbody> </table>	Depth (m)	Accuracy (m)	10	± 2.5	30	± 3.5	100	± 7.0	1000	± 52.0	Full area search not achieved, depth anomalies may be expected.	Low accuracy survey or data collected on an opportunity basis such as soundings on passage.
Depth (m)	Accuracy (m)													
10	± 2.5													
30	± 3.5													
100	± 7.0													
1000	± 52.0													
D	Worse than zone of confidence C	Worse than zone of confidence C	Full area search not achieved, large depth anomalies may be expected.	Poor quality data or data that cannot be quality assessed due to lack of information.										
U	Unassessed – The quality of the bathymetric data has yet to be assessed													

To decide on a ZOC Category, all conditions outlined in columns 2 to 4 of the Table must be met.

Explanatory notes quoted in the Table:

1 The allocation of a Zone of Confidence (ZOC) indicates that particular data meets minimum criteria for position and depth accuracy and seafloor coverage defined in this Table. ZOC categories reflect a charting standard and not just a hydrographic survey standard. Depth and position accuracies specified for each ZOC category refer to the errors of the final depicted soundings and include not only survey errors but also other errors introduced in the chart production process. Data is further qualified in Meta Feature Type **Quality of Bathymetric Data** (see clause 3.8) and associated Information Type **Spatial Quality** (see clause 24.5) attributes as follows:

a) Positional Accuracy (**horizontal position uncertainty**) and Sounding Accuracy (**vertical uncertainty**) on the associated instance of **Spatial Quality** may be used to indicate that a higher position or depth accuracy has been achieved than defined in this Table (for example a survey where full seafloor coverage was not achieved could not be classified higher than ZOC B; however, if the position accuracy was, for instance, ± 15 metres, the attribute **horizontal position uncertainty** could be used to indicate this).

b) Swept areas where the clearance depth is accurately known but the actual seabed depth is not accurately known may be accorded a 'higher' ZOC (that is, A1 or A2) providing positional and depth accuracies of the swept depth meets the criteria in this Table. In this instance, the attribute **depth range minimum value** on the **Quality of Bathymetric Data** feature may be used to specify the swept depth. The position accuracy criteria apply to the boundaries of swept areas.

c) The complex attribute **survey date range** on the **Quality of Bathymetric Data** feature is used to indicate the start and end dates of the survey(s) covering the area.

2 Position Accuracy of depicted soundings at 95% CI (2.45 sigma) with respect to the given datum. It is the cumulative error and includes survey, transformation and digitizing errors etc. Position accuracy need not be rigorously computed for ZOCs B, C and D but may be estimated based on type of equipment, calibration regime, historical accuracy etc.

3 Depth accuracy of depicted soundings = $a + (b \cdot d)/100$ at 95% CI (2.00 sigma), where d = depth in metres at the critical depth. Depth accuracy need not be rigorously computed for ZOCs B, C and D but may be estimated based on type of equipment, calibration regime, historical accuracy etc.

4 Significant seafloor features are defined as those rising above depicted depths by more than:

	<u>Depth</u>	<u>Significant Feature</u>
a.	<40 m	2 m
b.	>40 m	10% depth

A full seafloor search indicates that a systematic survey was conducted using detection systems, depth measurement systems, procedures, and trained personnel designed to detect and measure depths on significant seafloor features. Significant features are included on the chart as scale allows. It is impossible to guarantee that no significant feature could remain undetected, and significant features may have become present in the area since the time of the survey.

5 Typical Survey Characteristics – these descriptions should be seen as indicative examples only.

6 Controlled, systematic surveys (ZOC A1, A2 and B) – surveys comprising planned survey lines, on a geodetic datum that can be transformed to WGS 84.

7 Modern survey echo sounder – high precision single beam depth measuring equipment, generally including all survey echo sounders designed post 1970.

27.103 city name

IHO Definition: **CITY NAME.** The name of a town or city.

Attribute Type: Text

Remarks:

- The attribute **city name** should contain no more than 100 characters.

27.104 class of dangerous cargo (clsdng)

IHO Definition: Class of dangerous cargo.

1) One Blue Light / Cone

IHO Definition: Vessels carrying out transport operations involving certain flammable substances.

2) Two Blue Lights / Cones

IHO Definition: Vessels carrying out transport operations involving certain substances constituting health hazards.

3) Three Blue Lights / Cones

IHO Definition: Vessels carrying out transport operations involving certain explosives.

4) No Blue Light / Cone

IHO Definition: Vessels carrying out transport operations for which no blue light or blue cone is required.

5) One Red Light / Red Cone Top Down

IHO Definition: Russian inland waterway regulations: Vessels with one red light / red cone top down.

Remarks:

No remarks.

27.105 colour (COLOUR)

IHO Definition: **COLOUR**. The property possessed by an object of producing different sensations on the eye as a result of the way it reflects or emits light.

Attribute Type: Enumeration

- 1) **white**
- 2) **black**
- 3) **red**
- 4) **green**
- 5) **blue**
- 6) **yellow**
- 7) **grey**
- 8) **brown**
- 9) **amber**
- 10) **violet**
- 11) **orange**
- 12) **magenta**
- 13) **pink**

Remarks:

No remarks.

27.106 colour pattern (COLPAT)

IHO Definition: **COLOUR PATTERN.** A regular repeated design containing more than one colour.

Attribute Type: Enumeration

1) **horizontal stripes**

IHO Definition: Straight bands or stripes of differing colours oriented horizontally. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.113, November 2000).

2) **vertical stripes**

IHO Definition: Straight bands or stripes of differing colours oriented vertically. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.113, November 2000).

3) **diagonal stripes**

IHO Definition: Straight bands or stripes of differing colours oriented diagonally (that is, not horizontally or vertically). (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.113, November 2000).

4) **squared**

IHO Definition: Often referred to as checker plate, where alternate colours are used to create squares similar to a chess or draught board. The pattern may be straight or diagonal. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.113, November 2000).

5) **stripes (direction unknown)**

IHO Definition: Straight bands or stripes of differing colours oriented in an unknown direction. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.113, November 2000).

6) **border stripe**

IHO Definition: A band or stripe of colour which is displayed around the outer edge of the feature, which may also form a border to an inner pattern or plain colour. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.113, November 2000).

Remarks:

No remarks.

27.107 communication channel (COMCHA)

IHO Definition: **COMMUNICATION CHANNEL.** A channel number assigned to a specific radio frequency, frequencies or frequency band. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.114, November 2000).

Attribute Type: Text

Expected input: Enter specific Communication Channel.

Indication: Each Channel must be indicated in square brackets by 4 digits and up to 4 characters (A-Z).

Format: [XXXXXXX] (7 to 10 characters (mandatory))

Example: [VHF0007] for VHF-Channel 7
[NBDP5555] for Narrow Band Direct Printing Channel 5555

Remarks:

- The attribute “communication channel” encodes the various Channels used for all methods of radio communication.

27.108 condition (CONDTN)

IHO Definition: **CONDITION.** The various conditions of buildings and other constructions.

Attribute Type: Enumeration

1) under construction

IHO Definition: Being built but not yet capable of function. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

2) ruined

IHO Definition: A structure in a decayed or deteriorated condition resulting from neglect or disuse, or a damaged structure in need of repair. (IHO Dictionary – S-32).

3) under reclamation

IHO Definition: An area of the sea, a lake or the navigable part of a river that is being reclaimed as land, usually by the dumping of earth and other material. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.118, November 2000).

4) wingless

IHO Definition: A windmill or wind turbine from which the vanes or turbine blades are missing. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.118, November 2000).

5) planned construction

IHO Definition: Detailed planning has been completed but construction has not been initiated. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

Remarks:

- The attribute “condition” encodes the various conditions of buildings and other constructions. The default “condition” should be considered to be completed, undamaged and working normally. This attribute should, therefore, only be used to indicate features whose condition is anything other than “normal”.

27.109 contact instructions

IHO Definition: **CONTACT INSTRUCTIONS.** Instructions provided on how to contact a particular person, organisation or service.

Attribute Type: Text

Remarks:

- Where required, **contact instructions** should also provide information on the access times for a particular person, organisation or service.
- The attribute **contact instructions** should contain no more than 300 characters.

27.110 country name

IHO Definition: **COUNTRY NAME.** The name of a nation.

Attribute Type: Text

Remarks:

- The attribute **country name** should contain no more than 150 characters.

27.111 current velocity at high water level (curvhw)

IHO Definition: The rate of travel of a current at a high water level.

Attribute Type: Real

Unit: kilometre per hour (km/h)

Precision: 0·1km/h

Minimum range: 0

Example: 10 for a current velocity of 10 km/h at high water level

Remarks:

No remarks.

27.112 current velocity at low water level (curvlw)

IHO Definition: The rate of travel of a current at a low water level.

Attribute Type: Real

Unit: kilometre per hour (km/h)

Precision: 0·1km/h

Minimum range: 0

Example: 5 for a current velocity of 5 km/h at low water level

Remarks:

•No remarks.

27.113 current velocity at mean water level (curvmw)

IHO Definition: The rate of travel of a current at a mean water level.

Attribute Type: Real

Unit: kilometre per hour (km/h)

Precision: 0·1km/h

Minimum range: 0

Example: 7.5 for a current velocity of 7.5 km/h at mean water level

Remarks:

•No remarks.

27.114 current velocity at other water level (curvow)

IHO Definition: The rate of travel of a current at an other water level.

Attribute Type: Real

Unit: kilometre per hour (km/h)

Precision: 0·1km/h

Minimum range: 0

Example: 8.5 for a current velocity of 8.5 km/h at an other water level

Remarks:

- No remarks.

27.115 date disused

IHO Definition: **DATE DISUSED**. The date that an entity ceases to be used. (Adapted from S-4).

Attribute Type: Truncated date

Indication: Dates should be encoded using 4 digits for the calendar year (YYYY), 2 digits for the month (MM) (for example April = 04) and 2 digits for the day (DD). When no specific year, month and/or day is required/known, indication of the year, month and/or day is omitted, and replaced with dashes (-). See also clause 2.4.8.

Format:

YYYYMMDD	(full date, mandatory)
YYYYMM--	(no specific day required – mandatory)
YYYY----	(no specific month required – mandatory)

Example: 20160908 for 08 September 2016 as the date an entity ceased to be used.

Remarks:

- No remarks.

27.116 date end (**DATEND**, **PEREND**, **SUREND**)

IHO Definition: **DATE END**. The latest date on which an object (for example a buoy) will be present.

Attribute Type: Truncated date

Indication: Dates should be encoded using 4 digits for the calendar year (YYYY), 2 digits for the month (MM) (for example April = 04) and 2 digits for the day (DD). When no specific year, month and/or day is required/known, indication of the year, month and/or day is omitted, and replaced with dashes (-). See also clause 2.4.8.

Format:

YYYYMMDD	(full date, mandatory)
YYYYMM--	(no specific day required – mandatory)
YYYY----	(no specific month required – mandatory)
---MMDD	(same day each year, mandatory)
---MM--	(same month each year, mandatory)

Example: 20101203 for 03 December 2010 at 240000 hours as ending date.

---02-- for 28 February at 240000 hours as ending date for non-leap years; and 29 February at 240000 hours as ending date for leap years.

Remarks:

- The attribute **date end** indicates the latest date of an event or the end of a date range. This attribute is used to indicate the end of a fixed date range, the end of a periodic date range, or the removal or cancellation of a feature at a specific date in the future.

27.117 date fixed

IHO Definition: **DATE FIXED**. The date of an event.

Attribute Type: Truncated date

Indication: Dates should be encoded using 4 digits for the calendar year (YYYY), 2 digits for the month (MM) (for example April = 04) and 2 digits for the day (DD). When no specific year, month and/or day is required/known, indication of the year, month and/or day is omitted, and replaced with dashes (-). See also clause 2.4.8.

Format: ----MMDD (same day each year, **mandatory**)

----MM-- (same month each year, **mandatory**)

Example: ----0908 for 08 September each year.
----02-- for February of each year.

Remarks:

No remarks.

27.118 date start (DATSTA, PERSTA, SURSTA)

IHO Definition: **DATE START**. The earliest date on which an object (for example a buoy) will be present.

Attribute Type: Truncated date

Indication: Dates should be encoded using 4 digits for the calendar year (YYYY), 2 digits for the month (MM) (for example April = 04) and 2 digits for the day (DD). When no specific year, month and/or day is required/known, indication of the year, month and/or day is omitted, and replaced with dashes (-). See also clause 2.4.8.

<u>Format:</u>	YYYYMMDD	(full date, mandatory)
	YYYYMM--	(no specific day required – mandatory)
	YYYY----	(no specific month required – mandatory)
	----MMDD	(same day each year, mandatory)
	----MM--	(same month each year, mandatory)

Example: 20101129 for 29 November 2010 at 000000 hours as starting date.
----02-- for 01 February at 000000 hours annually as starting date.

Remarks:

- The attribute **date start** indicates the earliest date of an event or the start of a date range. This attribute is used to indicate the start of a fixed date range, the start of a periodic date range, or the deployment or implementation of a feature at a specific date in the future.

27.119 date variable

IHO Definition: **DATE VARIABLE**. A day which is not fixed in the Gregorian calendar.

Attribute Type: Text

Indication: The string encodes a recurring day each year that is not fixed in the Gregorian calendar.

Example: Fourth Thursday in November
Easter Sunday

Remarks:

- The attribute **date variable** should contain no more than 150 characters.

27.120 day of week

IHO Definition: **DAY OF WEEK**. Any one of seven days in a week.

Attribute Type: Enumeration

1) **Sunday**

IHO Definition: The day of the week following Saturday and preceding Monday.

2) **Monday**

IHO Definition: The day of the week following Sunday and preceding Tuesday.

3) **Tuesday**

IHO Definition: The day of the week following Monday and preceding Wednesday.

- Depth range is the depth from a specified sounding datum as a depth interval bounded by the minimum (shoalest) and maximum (deepest) depth values. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).
- Where the area dries, the value is negative or zero (0).

27.124 depth range minimum value (DRVAL1)

IHO Definition: **DEPTH RANGE MINIMUM VALUE.** The minimum (shoalest) value of a depth range. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.124, November 2000).

Attribute Type: Real

Unit: Metre (m)

Precision: 0·1m

Minimum range: -30

Maximum range: 12500

Range closure: Open interval (*minimum < depth range minimum < maximum*)

Example: 50 for a minimum depth of 50 metres

-3.5 for a minimum drying depth of 3.5 metres

Remarks:

- Depth range is the depth from a specified sounding datum as a depth interval bounded by the minimum (shoalest) and maximum (deepest) depth values. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).
- Where the area dries, the value is negative.

27.125 description of legal conditions (lg_des)

IHO Definition: Additional textual information which is related to the numerical description of the particular article/clause of the applicable law/regulation.

Remarks:

- Describes the details of legal conditions or indicates where detailed information can be found

27.126 destination

IHO Definition: **DESTINATION.** The place or general direction to which a vessel is going or directed.

Attribute Type: Text

Indication:

Remarks:

- The attribute **destination** should contain no more than 100 characters.

27.127 direction of impact (dirimp)

IHO Definition: Direction of impact.

1) Upstream

IHO Definition: Toward the source of a stream.

2) Downstream

IHO Definition: In the direction of flow of a current or stream

3) To the Left Bank

IHO Definition: Toward the left side of the bank.

4) To the Right Bank

IHO Definition: Toward the right side of the bank.

5) To Harbour

IHO Definition: To a harbour.

Remarks:

No remarks.

27.128 distance from notice mark, first (disbk1)

IHO Definition: Minimum distance of the impact of an area, which is signed by notice marks. The distance is measured from the notice mark rectangular to the bank.

Attribute Type: Real

Unit: Metre (m)

Precision: 0·1m

Minimum range: 0.1

Example: 15 for a minimum distance from the notice mark of 15 metres

Remarks:

No remarks.

27.129 distance from notice mark, second (disbk2)

IHO Definition: Maximum distance of the impact of an area, which is signed by notice marks. The distance is measured from the notice mark rectangular to the bank.

Attribute Type: Real

Unit: Metre (m)

Precision: 0·1m

Minimum range: 0.1

Example: 50 for a maximum distance from the notice mark of 50 metres

Remarks:

No remarks.

27.130 distance mark visible (CATDIS)

IHO Definition: **DISTANCE MARK VISIBLE.** A statement indicating whether a distance mark is visible or not.

Attribute Type: Boolean

Indication: A True value is an indication that the distance mark is visible.

Remarks:

- A **Distance Mark** feature having attribute **distance mark visible** = *True* is required to be associated to a structure feature using the feature association **Structure/Equipment** (see clause 25.12).

27.131 distance of impact, downstream (disipd)

IHO Definition: Downstream distance of the impact of an area, which is signed by notice marks. The distance is normally given on an additional mark left and/or right of the notice mark.

Attribute Type: Real

Unit: Metre (m)

Precision: 1m

Minimum range: 1

Example: **500** for a distance of impact downstream of 500 metres

Remarks:

No remarks.

27.132 distance of impact, upstream (disipu)

IHO Definition: Upstream distance of the impact of an area, which is signed by notice marks. The distance is normally given on an additional mark left and/or right of the notice mark.

Attribute Type: Real

Unit: Metre (m)

Precision: 1m

Minimum range: 1

Example: **500** for a distance of impact upstream of 500 metres

Remarks:

No remarks.

27.133 distance unit of measurement

IHO Definition: **DISTANCE UNIT OF MEASUREMENT.** A specified amount of a quantity, as of length, by comparison with which any other quantity of the same kind is measured or estimated.

Attribute Type: Enumeration

- 1) **metres**

IHO Definition: The basic unit of length in the International System of Units (SI) system. (Adapted from IHO Dictionary – S-32).

2) yards

IHO Definition: A common unit of linear measure in English-speaking countries, equal to 3 feet or 36 inches, and equivalent to 0.9144 metre. (Adapted from Wikipedia).

3) kilometres

IHO Definition: A unit of length, the common measure of distances equal to 1000 metres, and equivalent to 3280.8 feet or 0.621 mile.

4) statute miles

IHO Definition: A unit equal to 5280 feet. (Merriam-Webster Dictionary – 2019).

5) nautical miles

IHO Definition: A unit of length equal to 1,852 metres. This value was approved by the International Hydrographic Conference of 1929 and has been adopted by nearly all maritime states. (IHO Dictionary – S-32).

Remarks:

Remarks:

27.134 dredged date

IHO Definition: **DREDGED DATE**. The date that dredging occurred.

Attribute Type: Truncated date

Indication: Dates should be encoded using 4 digits for the calendar year (YYYY), 2 digits for the month (MM) (for example April = 04) and 2 digits for the day (DD). When no specific year, month and/or day is required/known, indication of the year, month and/or day is omitted, and replaced with dashes (-). See also clause 2.4.8.

Example: **20101203** for 03 December 2010 as the dredged date.

Remarks:

- The attribute **dredged date** indicates the latest date of dredging (which may be the latest known date if the dredged area is not maintained), or the date of the latest control survey confirming the depth in a maintained dredged area.

27.135 elevation (ELEVAT)

IHO Definition: **ELEVATION.** The altitude of the ground level of a feature, measured from a specified vertical datum. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.127, November 2000).

Attribute Type: Real

Unit: Defined as an attribute in the IENC dataset metadata: metre (m).

Precision: 0·1m

Minimum range: 0

Maximum range: 8850

Range closure: Closed interval ($\text{minimum} \leq \text{elevation} \leq \text{maximum}$)

Example: **47** for an elevation of 47 metres

Remarks:

No remarks.

27.136 elevation 1 of surface (m) (eleva1)

IHO Definition: The maximum elevation of the bottom of a river within a depth contour and referred to a gravitational reference level.

Attribute Type: Real

Unit: metre (m).

Precision: 0.1m

Minimum range: 0.0

Example: 47 for an elevation of 47 metres

Remarks:

No remarks.

27.137 elevation 2 of surface (m) (eleva2)

IHO Definition: The minimum elevation of the bottom of a river within a depth contour and referred to a gravitational reference level.

Attribute Type: Real

Unit: metre (m).

Precision: 0.1m

Minimum range: 0.0

Example: 47 for an elevation of 47 metres

Remarks:

No remarks.

27.138 elevation of water level (elevwl)

IHO Definition: Elevation of the water level of a specified feature point measured from the reference gravitational level defined in **reference gravitational level** (reflev).

Attribute Type: Real

Unit: metre (m)

Precision: 0.01m

Minimum range: 0

Minimum value: 0

Example: 240.05 for an elevation of the water level of 240.05 metres

Remarks:

No remarks.

27.139 estimated range of transmission (ESTRNG)

IHO Definition: **ESTIMATED RANGE OF TRANSMISSION.** The estimated range of a non-optical electromagnetic transmission. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.128, November 2000).

Attribute Type: Real

Unit: Nautical mile (M)

Precision: 0·1M

Minimum range: 0

Maximum range: 1000

Range closure: Open interval ($\text{minimum} < \text{estimated range of transmission} < \text{maximum}$)

Example: **45** for a maximum range of 45 nautical miles

Remarks:

- The estimated range (distance) assumes "in vacuo" transmission and a standard antenna height of 5 metres. Thus it gives a hint to the boatmaster whether they are likely to receive transmission at a certain distance from a feature carrying this attribute.

27.140 exhibition condition of light (EXCLIT)

IHO Definition: **EXHIBITION CONDITION OF LIGHT.** The outward display of the light.

Attribute Type: Enumeration

1) light shown without change of character

IHO Definition: A light shown throughout the 24 hours without change of character. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.129, November 2000).

2) daytime light

IHO Definition: A light which is only exhibited by day. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.129, November 2000).

3) fog light

IHO Definition: A light which is exhibited in fog or conditions of reduced visibility. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.129, November 2000).

4) night light

IHO Definition: A light which is only exhibited at night. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.129, November 2000).

Remarks:

Remarks:

27.141 exposition of sounding (EXPSOU)

IHO Definition: EXPOSITION OF SOUNDING. Indicates the relationship of the depth of a feature to the range of depth of the surrounding depth area.

Attribute Type: Enumeration

1) within the range of depth of the surrounding depth area

IHO Definition: The depth corresponds to the depth range of the surrounding depth area; that is, the depth is not shoaler than the minimum depth of the surrounding depth area or deeper than the maximum depth of the surrounding depth area. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.130, November 2000).

2) shoaler than the range of depth of the surrounding depth area

IHO Definition: The depth is shoaler than the minimum depth of the surrounding depth area. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.130, November 2000).

3) deeper than the range of depth of the surrounding depth area

IHO Definition: The depth is deeper than the maximum depth of the surrounding depth area. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.130, November 2000).

Remarks:

- This attribute indicates features with a “value of sounding” not within the range of depth of the surrounding depth area. These features could be a potential danger for navigation.

27.142 file locator

IHO Definition: **FILE LOCATOR**. The location of a fragment of text or other information in a support file.

Attribute Type: Text

Indication: For S-401, the string encodes the location of a single fragment of text or other information contained in an IENC support file.

Example: p-224.105(a)(1)

Remarks:

No remarks.

27.143 file reference (*TXTDSC, NTXTDS*)

IHO Definition: **FILE REFERENCE**. The file name of an externally referenced text file. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.209, November 2000).

Attribute Type: Text

Indication: For S-401, the string encodes the file name of a single textual IENC support file that contains the textual information.

Format: **101CCCC000000000000.EEE** (See S-401 Main document, clause 11.4.3 (mandatory))

Remarks:

- The attribute **file reference** indicates that a file containing text extracted from relevant pilot books or nautical publications is available.
- The files referenced by **file reference** must be .TXT and may contain formatted text.
- The files referenced by this attribute generally contain long text strings.

27.144 flare bearing

IHO Definition: **FLARE BEARING**. The bearing about which the light flare symbol is rotated to be displayed in ECDIS.

Attribute Type: Integer

Indication: Indicates the bearing of the light flare to be included in the data for Inland ECDIS or ECS display purposes where different from the defaults. The value encoded corresponds to a bearing away from the position of the light.

Unit: Degree (°)

Minimum range: 0

Maximum range: 360

Range closure: Right half-open interval (*minimum ≤ flare bearing < maximum*)

Example: **270** for an flare bearing of 270 degrees away from the light

Remarks:

- The attribute **flare bearing** may be populated to cartographically align light flares where it is required to display the flare at a different bearing from the default. For example, **flare bearing** may be populated to align the flare along a transit or leading line (noting that in such cases the bearing to be encoded will be the reciprocal (+/- 180° of the bearing encoded for the navigational line); or to avoid other important encoded information.
- The default bearing of a light flare (135°) is provided as a function of the S-401 Portrayal Catalogue. Where two all-around lights are collocated, one of the light flares is displayed at a bearing of 45°, also as a function of the S-401 Portrayal Catalogue, as follows:
 - If one of the lights is a white, yellow or orange light, it is displayed at a bearing of 45°.
 - If none of the lights is a white, yellow or orange light there is no preference.

27.145 flare stack

IHO Definition: **FLARE STACK**. A tall structure used for burning-off waste oil or gas. (IHO Dictionary – S-32).

Attribute Type: Boolean

Indication: A True value is an indication that the offshore platform contains a flare stack.

Remarks:

- The attribute **flare stack** is a statement expressing whether an offshore platform has a stack used for burning-off waste oil or gas or not.

27.146 frequency shore station receives

IHO Definition: **FREQUENCY SHORE STATION RECEIVES**. The shore station receiver frequency. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.187, November 2000).

Attribute Type: Integer

Unit: Hertz (Hz)

Minimum range: 0

Range closure: Left half-open ray (*minimum < frequency shore station receives*)

Example: **950000000** for a radio signal centred on 950 MHz

Remarks:

No remarks.

27.147 frequency shore station transmits (SIGFRQ)

IHO Definition: **FREQUENCY SHORE STATION TRANSMITS**. The shore station transmitter frequency. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.187, November 2000).

Attribute Type: Integer

Unit: Hertz (Hz)

Minimum range: 0

Range closure: Left half-open ray (*minimum < frequency shore station transmits*)

Example: **950000000** for a radio signal centred on 950 MHz

Remarks:

No remarks.

27.148 function (FUNCTN)

IHO Definition: **FUNCTION**. A specific role that describes a feature.

Attribute Type: Enumeration

2) **harbour-masters office**

IHO Definition: A local official who has charge of mooring and berthing of vessels, collecting harbour fees, etc. (Adapted from IHO Dictionary – S-32).

3) **customs office**

IHO Definition: Serves as a government office where customs duties are collected, the flow of goods are regulated and restrictions enforced, and shipments or vehicles are cleared for entering or leaving a country. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

4) **health office**

IHO Definition: The office which is charged with the administration of health laws and sanitary inspections. (Adapted from The New Shorter Oxford English Dictionary, 1993).

5) **hospital**

IHO Definition: An institution or establishment providing medical or surgical treatment for the ill or wounded. (The New Shorter Oxford English Dictionary, 1993).

6) **post office**

IHO Definition: The public department, agency or organisation responsible primarily for the collection, transmission and distribution of mail. (The New Shorter Oxford English Dictionary, 1993).

7) **hotel**

IHO Definition: An establishment, especially of a comfortable or luxurious kind, where paying visitors are provided with accommodation, meals and other services. (The New Shorter Oxford English Dictionary, 1993).

8) **railway station**

IHO Definition: A building with platforms where trains arrive, load, discharge and depart. (The New Shorter Oxford English Dictionary, 1993).

9) **police station**

IHO Definition: The headquarters of a local police force and that is where those under arrest are first charged. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

10) **water-police station**

IHO Definition: The headquarters of a local water-police force. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

11) **pilot office**

IHO Definition: The office or headquarters of pilots; the place where the services of a pilot may be obtained. (IHO Dictionary – S-32).

12) **pilot lookout**

IHO Definition: A distinctive structure or place on shore from which personnel keep watch upon events at sea or along the coast. (IHO Dictionary – S-32).

13) **bank office**

IHO Definition: An office for custody, deposit, loan, exchange or issue of money. (Adapted from The New Shorter Oxford English Dictionary, 1993).

14) headquarters for district control

IHO Definition: The quarters of an executive officer (director, manager, etc.) with responsibility for an administrative area. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.132, November 2000).

15) transit shed/warehouse

IHO Definition: A building or part of a building for storage of wares or goods. (Adapted from The New Shorter Oxford English Dictionary, 1993).

16) factory

IHO Definition: A building or buildings with equipment for manufacturing; a workshop. (The New Shorter Oxford English Dictionary, 1993).

17) power station

IHO Definition: A stationary plant containing apparatus for large scale conversion of some form of energy (such as hydraulic, steam, chemical or nuclear energy) into electrical energy. (McGraw-Hill Dictionary of Scientific and Technical Terms, 3rd Edition, 1984).

18) administrative

IHO Definition: A building for the management of affairs. (Adapted from The New Shorter Oxford English Dictionary, 1993).

19) educational facility

IHO Definition: An establishment for teaching and learning (for example school, college, university, etc). (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

20) church

IHO Definition: A building for public Christian worship. (The New Shorter Oxford English Dictionary, 1993).

21) chapel

IHO Definition: A place for Christian worship other than a parish, cathedral or church, especially one attached to a private house or institution. (The New Shorter Oxford English Dictionary, 1993).

22) temple

IHO Definition: A building for public Jewish worship. (Adapted from The New Shorter Oxford English Dictionary, 1993).

23) pagoda

IHO Definition: A Hindu or Buddhist temple or sacred building. (The New Shorter Oxford English Dictionary, 1993).

24) shinto shrine

IHO Definition: A building for public Shinto worship. (Adapted from The New Shorter Oxford English Dictionary, 1993).

25) buddhist temple

IHO Definition: A building for public Buddhist worship. (Adapted from The New Shorter Oxford English Dictionary, 1993).

26) mosque

IHO Definition: A Muslim place of worship. (The New Shorter Oxford English Dictionary, 1993).

27) marabout

IHO Definition: A shrine marking the burial place of a Muslim holy man. (The New Shorter Oxford English Dictionary, 1993).

28) lookout

IHO Definition: Keeping a watch upon events at sea or along the coast. (Adapted from IHO Dictionary – S-32).

29) communication

IHO Definition: Transmitting and/or receiving electronic communication signals. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

30) television

IHO Definition: A system for reproducing on a screen visual images transmitted (usually with sound) by radio signals. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

31) radio

IHO Definition: Transmitting and/or receiving radio-frequency electromagnetic waves as a means of communication. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

32) radar

IHO Definition: A method, system or technique of using beamed, reflected, and timed radio waves for detecting, locating, or tracking objects, and for measuring altitudes. (IHO Dictionary – S-32).

33) light support

IHO Definition: A structure serving as a support for one or more lights. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

34) microwave

IHO Definition: Broadcasting and receiving signals using microwaves. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.133, November 2000).

35) cooling

IHO Definition: Generation of chilled liquid and/or gas for cooling purposes. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

36) observation

IHO Definition: A place from which the surroundings can be observed but at which a watch is not habitually maintained. (Adapted from IHO Dictionary – S-32).

37) timeball

IHO Definition: A visual time signal in the form of a ball. (IHO Dictionary – S-32).

38) clock

IHO Definition: Instrument for measuring time and recording hours. (IHO Dictionary – S-32).

39) control

IHO Definition: Used to control the flow of traffic within a specified range of an installation. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

40) airship mooring

IHO Definition: Equipment or structure to secure an airship. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

41) stadium

IHO Definition: An arena for holding and viewing events. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

42) bus station

IHO Definition: A building where buses and coaches regularly stop to take on and/or let off passengers, especially for long-distance travel. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

44) sea rescue control

IHO Definition: A unit responsible for promoting efficient organization of search and rescue services and for coordinating the conduct of search and rescue operations within a search and rescue region. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

45) observatory

IHO Definition: A building designed and equipped for making observations of astronomical, meteorological, or other natural phenomena. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

46) ore crusher

IHO Definition: A building or structure used to crush ore.

47) boathouse

IHO Definition: A building or shed, usually built partly over water, for sheltering a boat or boats.

48) pumping station

IHO Definition: A facility to move solids, liquids or gases by means of pressure or suction. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2013).

Remarks:

No remarks.

27.149 function of notice mark (fnctnm)

IHO Definition: Function of a notice mark.

1) Prohibition Mark

IHO Definition: Marks which indicate a prohibition.

2) Regulation Mark

IHO Definition: Marks which indicate a regulation.

3) Restriction Mark

IHO Definition: Marks which indicate a restriction.

4) Recommendation Mark

IHO Definition: Marks which indicate a recommendation.

5) Information Mark

IHO Definition: Marks with general information.

Remarks:

No remarks.

27.150 function of sensor (fnctsn)

IHO Definition: Function of sensor.

1) Reduce Bridge Lighting

IHO Definition: Reduce decorative bridge lighting.

Remarks:

No remarks.

27.151 headline

IHO Definition: **HEADLINE**. Words set at the head of a passage or page to introduce or categorize. (Merriam-Webster Dictionary – 2012).

Attribute Type: Text

Indication: The string encodes the heading relevant to a text string or information contained in an IENC support file.

Example: Description of table format for S-401 meta and geo features

Remarks:

- The attribute **headline** should contain no more than 100 characters.

27.152 height (HEIGHT)

IHO Definition: HEIGHT. The value of the vertical distance to the highest point of the feature, measured from a specified vertical datum. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.134, November 2000).

Attribute Type: Real

Unit: Defined as an attribute in the IENC dataset metadata: metre (m)

Precision: 0·1m

Minimum range: 0

Maximum range: 8850

Range closure: Left half-open interval

(*minimum* < **height** ≤ *maximum*)

Example: 73 for a height of 73 metres

Remarks:

- Height must not be used for floating features.

27.153 horizontal clearance length

IHO Definition: **HORIZONTAL CLEARANCE LENGTH.** The length of a feature, such as a lock or basin, which is available for safe navigation. This may, or may not, be the same as the total physical length of the feature. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.137, November 2000).

Attribute Type: Real

Unit: Defined as an attribute in the IENC dataset metadata: metre (m)

Precision: 0·1m

Minimum range: 0

Range closure: Left half-open ray

(minimum < horizontal clearance length)

Example: 75 for a horizontal clearance length of 75 metres

Remarks:

Remarks.

27.154 horizontal clearance value (HORCLR)

IHO Definition: **HORIZONTAL CLEARANCE VALUE.** The physical horizontal clearance distance between two points on a feature, such as a bridge span, dock, gate, lock or tunnel.

Precision: 0·1m

Minimum range: 0

Range closure: Left half-open ray (*minimum < horizontal width*)

Example: 12.6 for a width of 12.6 metres

Remarks:

No remarks.

27.158 ice factor (ICEFAC)

IHO Definition: **ICE FACTOR.** The value of the maximum variation in the vertical clearance of an overhead cable due to an accumulation of ice. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.140, November 2000).

Attribute Type: Real

Unit: Defined as an attribute in the IENC dataset metadata: metre (m)

Precision: 0·1m

Minimum range: 0

Maximum range: 20

Range closure: Left half-open interval (*minimum < ice factor ≤ maximum*)

Example: 2.5 for a reduction of 2·5 metres in the vertical clearance.

Remarks:

No remarks.

27.159 IMO adopted (CATTSS)

IHO Definition: **IMO ADOPTED.** A defined maritime traffic route that has been adopted as an IMO routeing measure. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.99, November 2000).

Attribute Type: Boolean

Indication: A True value is an indication that the routeing measure has been adopted by the IMO.

Remarks:

No remarks.

27.160 in dispute

IHO Definition: **IN DISPUTE.** A statement that expresses if an area is in a jurisdictional dispute.

Attribute Type: Boolean

Indication: A True value is an indication that the area defined is in jurisdictional dispute.

Remarks:

No remarks.

27.161 interoperability identifier

IHO Definition: **INTEROPERABILITY IDENTIFIER.** A common unique identifier for entities which describe a single real-world feature, and which is used to identify instances of the feature in end-user systems where the

feature may be included in multiple data product types. (IHO Nautical Information Provision Working Group, 2023).

Attribute Type: Universal Resource Name (URN)

Indication: The identifier is encoded using the Maritime Resource Name (MRN) concept and namespace, administered by IALA, that follows the syntax and semantics for URNs specified in RFC 2141.

Format: `urn:mrn:[Organisational ID]:...:...` (mandatory)

Example: `urn:mrn:ihc:mc:1234.5`

Remarks:

For further information regarding MRNs, see S-100 Part 3, clause 3-10.

Inland specific Encoding Instructions:

The attribute **interoperability identifier** (see clause 27.161) should be used to encode a unique identifier of the respective feature. The unique identifier allows the connection of the information regarding the feature in the IENC with information provided by other services (e.g. AIS or Notices to Skippers). The attribute **interoperability identifier** can be encoded with a MRN in accordance with the rules of IALA or another organization or with a MRN specific for Inland ENCs.

The structure of the MRN for Inland ENCs is:

`urn:mrn:iehg:<type>'<type-specific-part>'<type>'<type-specific-part>` has to be encoded in accordance with one of the following options:

a. <type> uuid

If the type `uuid` is used the `<type-specific-part>` has to be encoded with a UUID in accordance with https://en.wikipedia.org/wiki/Universally_unique_identifier.

Example:

`urn:mrn:iehg:uuid:123e4567-e89b-12d3-a456-426614174000`

b. <type> obj

If the type `obj` is used the `<type-specific-part>` has to be filled with `:<ISO 3166 Code>:<managed name spaces>`.

where `<ISO 3166 Code>` is the identifier defined by ISO 3166-1 alpha-2 codes for the representation of names of a country, territory, or area of geographical interest.

The national IENC authority (e.g. national IEHG member) must ensure, that the `<managed name spaces>` is unique within the domain, and that the syntax of the `<managed name spaces>` complies with the general MRN guidelines. The national IENC authority can assign codes to other national organizations that can manage their own namespaces.

Examples:

`urn:mrn:iehg:obj:us:fa:42.42`

In this example the fleeting area with identifier 42.42 defined by the USACE.

`urn:mrn:iehg:obj:be:dvw:lock123`

In this example the ISO 3166 code for Belgium is `be`. Within Belgium there are different local authorities and so a further identifier is used: `dvw` for Vlaamse Waterweg in this example where the Flemish lock identifier is `lock123`.

c. use of a type code for a specific type of objects as <type>

Any IEHG member can submit a request for a new `<type>` for a specific type of objects (e.g. lock, bridge) to IEHG via the IEHG discussion forum. The request has to contain the rules how to guarantee the uniqueness of the MRN that will be assigned for that `<type>`. It may for example be the rule to encode `<ISO 3166 Code>:<managed name spaces>` for the respective type of object (as described under Lb). The request should also define an area of applicability, e.g. one or more countries or a region. The request is adopted if

there is no veto within 6 weeks. The adopted types and the rules for the encoding will be published on <https://ienc.openecdis.org> and in the next version or edition of the Encoding Guide.

d. use of a unique solution for a region as <type>

If a region that does not have an ISO 3166 code agrees on a common namespace management it can submit a request for a new <type> to IEHG via the discussion forum. The request has to contain the rules how to ensure the uniqueness of the MRN that will be assigned for that <type>. The request should also define an area of applicability. The request is adopted if there is no veto within 6 weeks. The adopted types and rules for the encoding will be published on <https://ienc.openecdis.org> and in the next version or edition of the Encoding Guide.

In Europe the attribute has to be encoded:

- with an existing maritime MRN
- in accordance with letter a, <type> uuid , if no maritime MRN but a RIS-ID is available.

27.162 is MRCC

IHO Definition: **IS MRCC.** A statement that expresses if a Coast Guard station performs the function of a Maritime Rescue and Coordination Centre.

Attribute Type: Boolean

Indication: A True value is an indication that the encoded Coast Guard station performs the function of a Maritime Rescue and Coordination Centre.

Remarks:

No remarks.

27.163 jurisdiction (JRSDTN)

IHO Definition: **JURISDICTION.** The jurisdiction applicable to an administrative area. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.142, November 2000).

Attribute Type: Enumeration

1) **international**

IHO Definition: Involving more than one country; covering more than one national area. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.142, November 2000).

2) **national**

IHO Definition: An area administered or controlled by a single nation. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.142, November 2000).

3) **national sub-division**

IHO Definition: An area smaller than the nation in which it lies. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.142, November 2000).

Remarks:

No remarks.

27.164 language

IHO Definition: **LANGUAGE.** The method of human communication, either spoken or written, consisting of the use of words in a structured and conventional way.

Attribute Type: Text

Indication: The language is encoded by a character code following ISO 639-2/T.

Format: c3 (mandatory)

Example: eng for English

Remarks:

- The attribute **language** indicates the language of the specific text.

27.165 lifting capacity (LIFCAP)

IHO Definition: **LIFTING CAPACITY.** The specific safe lifting capacity of a feature. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.145, November 2000).

Attribute Type: Real

Unit: Tonne (t)

Precision: 0·1t

Minimum range: 0

Range closure: Left half-open ray (*minimum < lifting capacity*)

Example: 120 for a lifting capacity of 120 tonnes

Remarks:

No remarks.

27.166 light characteristic (LITCHR)

IHO Definition: **LIGHT CHARACTERISTIC.** The distinct character, such as fixed, flashing, or occulting, which is given to each light to avoid confusion with neighbouring ones. (IHO Dictionary – S-32).

Attribute Type: Enumeration

1) **fixed**

IHO Definition: A signal light that shows continuously, in any given direction, with constant luminous intensity and colour. (IHO Dictionary – S-32).

2) **flashing**

IHO Definition: A rhythmic light in which the total duration of light in a period is clearly shorter than the total duration of darkness and all the appearances of light are of equal duration. (IHO Dictionary – S-32).

3) **long-flashing**

IHO Definition: A single-flashing light in which an appearance of light of not less than two seconds duration is regularly repeated. (IALA International Dictionary of Marine Aids to Navigation).

4) **quick-flashing**

IHO Definition: A rhythmic light in which flashes are repeated at a rate of not less than 50 flashes per minutes but less than 80 flashes per minutes. It may be:

- *Continuous quick-flashing:* A quick-flashing light in which a flash is regularly repeated.
 - *Group quick-flashing:* A quick-flashing light in which a group of two or more flashes, which are specified in number, is regularly repeated.
- (IALA International Dictionary of Marine Aids to Navigation).

5) **very quick-flashing**

IHO Definition: A rhythmic light in which flashes are repeated at a rate of not less than 80 flashes per minute but less than 160 flashes per minute. It may be:

- *Continuous very quick-flashing:* A very quick-flashing light in which a flash is regularly repeated.
- *Group very quick-flashing:* A very quick-flashing light in which a group of two or more flashes, which are specified in number, is regularly repeated.

(IALA International Dictionary of Marine Aids to Navigation).

6) continuous ultra quick-flashing

IHO Definition: A rhythmic light in which flashes are regularly repeated at a rate of not less than 160 flashes per minute. (IALA International Dictionary of Marine Aids to Navigation).

7) isophased

IHO Definition: A light with all durations of light and darkness equal. (IHO Dictionary – S-32).

8) occulting

IHO Definition: A rhythmic light in which the total duration of light in a period is clearly longer than the total duration of darkness and all the eclipses are of equal duration. It may be:

- *Single-occulting:* An occulting light in which an eclipse is regularly repeated.
- *Group-occulting:* An occulting light in which a group of two or more eclipses, which are specified in number, is regularly repeated.
- *Composite group-occulting:* An occulting light in which a sequence of groups of one or more eclipses, which are specified in number, is regularly repeated, and the groups comprise different numbers of eclipses.

(IALA International Dictionary of Marine Aids to Navigation).

9) interrupted quick flashing

IHO Definition: A quick light in which the sequence of flashes is interrupted by regularly repeated eclipses of constant and long duration. (Hydrographic Dictionary, Part I Volume I, English)

10) interrupted very quick flashing

IHO Definition: A light in which the very rapid alterations of light and darkness are interrupted at regular intervals by eclipses of long duration. (Hydrographic Dictionary, Part I Volume I, English)

11) interrupted ultra quick-flashing

IHO Definition: A light in which the ultra quick flashes (160 or more per minute) are interrupted at regular intervals by eclipses of long duration. (IHO Dictionary – S-32).

12) morse

IHO Definition: A rhythmic light in which appearances of light of two clearly different durations are grouped to represent a character or characters in the Morse code. (IHO Dictionary – S-32).

13) fixed and flash

IHO Definition: A rhythmic light in which a fixed light is combined with a flashing light of higher luminous intensity. (IHO Dictionary – S-32).

14) flash and long-flash

IHO Definition: A rhythmic light in which a flashing light is combined with a long-flashing light of higher luminous intensity. (Adapted from IHO Dictionary – S-32).

15) occulting and flash

IHO Definition: A rhythmic light in which an occulting light is combined with a flashing light of higher luminous intensity. (Adapted from IHO Dictionary – S-32).

16) fixed and long-flash

IHO Definition: A rhythmic light in which a fixed light is combined with a long-flashing light of higher luminous intensity. (Adapted from IHO Dictionary – S-32).

17) occulting alternating

IHO Definition: An alternating light in which the total duration of light in each period is clearly longer than the total duration of darkness and in which the intervals of darkness (occultations) are all of equal duration. (Adapted from IALA International Dictionary of Marine Aids to Navigation).

18) long-flash alternating

IHO Definition: An alternating single-flashing light in which an appearance of light of not less than two seconds duration is regularly repeated. (Adapted from IALA International Dictionary of Marine Aids to Navigation).

19) flash alternating

IHO Definition: An alternating rhythmic light in which the total duration of light in a period is clearly shorter than the total duration of darkness and all the appearances of light are of equal duration. (Adapted from IALA International Dictionary of Marine Aids to Navigation).

20) group alternating

IHO Definition: Occulting light in which the occultations are combined in groups, each group including the same number of occultations, and in which the groups are repeated at regular intervals. (International Dictionary of Marine Aids to Navigation).

25) quick-flash plus long-flash

IHO Definition: A rhythmic light in which a group of quick flashes is followed by one or more long flashes in a regularly repeated sequence with a regular periodicity. (Adapted from IALA International Dictionary of Marine Aids to Navigation).

26) very quick-flash plus long-flash

IHO Definition: A rhythmic light in which a group of very quick flashes is followed by one or more long flashes in a regularly repeated sequence with a regular periodicity. (Adapted from IALA International Dictionary of Marine Aids to Navigation).

27) ultra quick-flash plus long-flash

IHO Definition: A rhythmic light in which a group of ultra quick flashes is followed by one or more long flashes in a regularly repeated sequence with a regular periodicity. (Adapted from IALA International Dictionary of Marine Aids to Navigation).

28) alternating

IHO Definition: A signal light that shows continuously, in any given direction, two or more colours in a regularly repeated sequence with a regular periodicity. (IALA International Dictionary of Marine Aids to Navigation).

29) fixed and alternating flashing

IHO Definition: A rhythmic light in which a fixed light is combined with a flashing light of higher luminous intensity and different colour.

Remarks:

- A selection of the above characteristics is defined and illustrated diagrammatically in IHO Chart Specifications, S-4 – B-471.2.

27.167 light visibility (LITVIS)

IHO Definition: **LIGHT VISIBILITY.** The specific visibility of a light, with respect to the light's intensity and ease of recognition.

Attribute Type: Enumeration

1) high intensity

IHO Definition: Non-marine lights with a higher power than marine lights and visible from well off shore (often "Aero" lights). (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.148, November 2000).

2) low intensity

IHO Definition: Non-marine lights with lower power than marine lights. (Bundesamt für Seeschifffahrt und Hydrographie, Germany).

3) faint

IHO Definition: A decrease in the apparent intensity of a light which may occur in the case of partial obstructions. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.148, November 2000).

4) **intensified**

IHO Definition: A light in a sector is intensified (that is, has longer range than other sectors). (Bundesamt für Seeschifffahrt und Hydrographie, Germany).

5) **unintensified**

IHO Definition: A light in a sector is unintensified (that is, has shorter range than other sectors). (Bundesamt für Seeschifffahrt und Hydrographie, Germany).

6) **visibility deliberately restricted**

IHO Definition: A light sector is deliberately reduced in intensity, for example to reduce its effect on a built-up area. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.148, November 2000).

7) **obscured**

IHO Definition: Said of the arc of a light sector designated by its limiting bearings in which the light is not visible from seaward. (IHO Dictionary – S-32).

8) **partially obscured**

IHO Definition: This value specifies that parts of the sector are obscured. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.148, November 2000).

9) **visible in line of range**

IHO Definition: Lights that must be in line to be visible.

Remarks:

- The attribute “light visibility” encodes the specific visibility of a light, with respect to the light’s intensity and ease of recognition.

27.168 linkage

IHO Definition: **LINKAGE**. Location (address) for online access using a URL/URI address or similar addressing scheme. (Adapted from ISO 19115-1:2014).

Attribute Type: URI

Indication: Character encoding of a URI must follow the syntax rules defined in RFC 3986.

Format: **http://.....** or **https://.....** (mandatory)

Example: <https://www.ihc.int>

Remarks:

- For S-401, the attribute type URI is constrained to conformance with the HTTP or HTTPS protocols; that is, the character string must commence with *http://* or *https://*.

27.169 major light

IHO Definition: **MAJOR LIGHT**. A statement expressing if a light is considered to be a major light in terms of ECDIS display in a particular area.

Attribute Type: Boolean

Indication: A True value is an indication that the light is considered to be a major light.

Remarks:

- The attribute **major light** is only intended to provide an indication to the Inland ECDIS or ECS that the light is considered to be an important light in terms of its display. As such this is a cartographic attribute to aid the

compiler in determining the most appropriate display for a light; it is not intended to be used as a formal classification method for lights.

27.170 marks navigational – system of (MARSYS)

IHO Definition: **MARKS NAVIGATIONAL – SYSTEM OF.** The system of navigational buoyage a region complies with.

Attribute Type: Enumeration

1) **IALA A**

IHO Definition: Navigational aids conform to the International Association of Lighthouse Authorities – IALA A system. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.149, November 2000).

2) **IALA B**

IHO Definition: Navigational aids conform to the International Association of Lighthouse Authorities – IALA B system. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.149, November 2000).

9) **no system**

IHO Definition: Navigational aids do not conform to any defined system. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.149, November 2000).

10) **other system**

IHO Definition: Navigational aids conform to a defined system other than International Association of Lighthouse Authorities - IALA. (IHO Transfer Standard for Digital Hydrographic Data, Appendix A: Object Catalogue - Description of the Feature Coding Schema to be Used for Hydrographic Requirements)

11) **main European inland waterway marking system**

IHO Definition: Navigational aids as required in international, national or regional regulations that contain the same navigational aids as the European Code for Inland Waterways of UNECE, or if there is no regulation for a waterway, navigational aids as recommended in the European Code for Inland Waterways of UNECE. (Inland ENC Harmonization Group (IEHG)).

12) **Russian inland waterway regulations**

IHO Definition: Navigational aids conform to the Russian inland waterway regulations. (Electronic Chart Display and Information System for Inland Navigation, Section 2: Data Standard, Appendix A: Object Catalogue for Inland ECDIS)

13) **Brazilian national inland waterway regulation**

IHO Definition: Navigational aids conform to the Brazilian national inland waterway regulation (Inland ENC Harmonization Group)

15) **Paraguay-Parana waterway – Brazilian complementary aids**

IHO Definition: Navigational aids conform to the Brazilian complementary aids on the Paraguay-Parana waterway. (Electronic Chart Display and Information System for Inland Navigation, Section 2: Data Standard, Appendix A: Object Catalogue for Inland ECDIS)

Remarks:

- For IENCs 10 (other system) shall only be used if none of the other enumerations is applicable.

27.171 maximal permitted beam (lg_bme)

IHO Definition: The maximal permitted beam (width of a ship's hull) of a vessel or convoy according to the particular article/clause of the applicable law/regulation.

Attribute Type: Real

Unit: metre (m)

Precision: 0·01m

Minimum range: 0.01

Maximum range: 60 Example: 11.40 for a maximal permitted beam of 11·40 metres

Remarks:

No remarks.

27.172 maximal permitted draught (lg_drt)

IHO Definition: The maximal permitted draught of a vessel or convoy according to the particular article/clause of the applicable law/regulation.

Attribute Type: Real

Unit: metre (m)

Precision: 0·01m

Minimum range: 0.01

Maximum range: 50

Example: 2.50 for a maximal permitted draught of 2·50 metres

Remarks:

No remarks.

27.173 maximal permitted length (lg_lgs)

IHO Definition: The maximal permitted length of a vessel or convoy according to the particular article/clause of the applicable law/regulation.

Attribute Type: Real

Unit: metre (m)

Precision: 0·01m

Minimum range: 0.01

Maximum range: 300

Example: 101.40 for a maximal permitted length of 101·40 metres

Remarks:

No remarks.

27.174 maximal permitted speed (lg_spd)

IHO Definition: The maximal permitted vessel speed according to the particular article/clause of the applicable law/regulation.

Attribute Type: Real

Unit: kilometre per hour (km/h)

Precision: 0·1m

Example: **30.5** for a maximum permitted vessel length of 30.5 metres

Remarks:
No remarks.

27.178 measured distance

IHO Definition: **MEASURED DISTANCE**. A course at sea, whose ends are indicated by ranges ashore, and whose length has been accurately measured for determining the speed of vessels. (IHO Dictionary – S-32).

Attribute Type: Integer

Unit: Defined as an attribute in the IENC dataset metadata: metre (m)

Minimum range: 0

Range closure: Left half-open ray $(\text{minimum} < \text{measured distance})$

Example: **1445** for a measured distance of 1445 metres

Remarks:

No remarks.

27.179 minimum berth depth (*DRVAL1*)

IHO Definition: **MINIMUM BERTH DEPTH.** The least depth of the body of water at the berth or in a berth pocket adjacent to the berth. (IHO Nautical Information Provision Working Group, 2022).

Attribute Type: Real

Unit: Defined as an attribute in the IENC dataset metadata: metre (m)

Precision: 0·1m

Minimum range: 0

Maximum range: 30

Range closure: Left half-open interval ($\text{minimum} < \text{minimum berth depth} \leq \text{maximum}$)

Example: **14.6** for a minimum berth depth of 14.6 metres

Remarks:

Remarks.

27.180 MMSI code

IHO Definition: MMSI CODE. The Maritime Mobile Service Identity (MMSI) Code is formed of a series of nine digits which are transmitted over the radio path in order to uniquely identify ship stations, ship earth stations, coast stations, coast earth stations, and group calls. These identities are formed in such a way that the identity or part thereof can be used by telephone and telex subscribers connected to the general telecommunications network principally to call ships automatically. (Adapted from Appendix 43 of the International Telecommunications Union Radio Regulations).

Attribute Type: Text

Indication: MMSI code (c...): String of nine characters.

Example: **366777490**

Remarks:

- The attribute **MMSI code** must contain exactly 9 characters.

27.181 moiré effect

IHO Definition: **MOIRE EFFECT.** A short range (up to 2km) type of directional light. Sodium lighting gives a yellow background to a screen on which a vertical black line will be seen by an observer on the centre line. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.49, November 2000).

Attribute Type: Boolean

Indication: A True value is an indication that the encoded light is a moiré effect light.

Remarks:

No remarks.

27.182 multiplicity known

IHO Definition: **MULTIPLICITY KNOWN.** The number of features of identical character that exist as a co-located group is or is not known. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.150, November 2000).

Attribute Type: Boolean

Indication: A True value is an indication that the exact number of features is known.

Remarks:

No remarks.

27.183 name (*OBJNAM*, *NOBJNM*)

IHO Definition: **NAME.** The individual name of a feature. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.158, November 2000).

Attribute Type: Text

Indication: Name of feature (c...): String of characters.

Format: c...

Example: Monaco

Remarks:

- The attribute **name** encodes the individual name of a feature (see clause 2.5.8).
- The attribute **name** should contain no more than 75 characters.

27.184 name of other locally relevant water level (othnam)

IHO Definition: Name of the water level, which is used for the attribute valueAtOtherLocallyRelevantWaterLevel including version identification, for example year of issue or period.

Attribute Type: Text

Indication: Name of water level (c...): String of characters.

Format: c...

Example: HQ 100 2020

Remarks:

No remarks.

27.185 name of relevant high water level (highnam)

IHO Definition: Name of the water level, which is used for the attribute valueAtRelevantHighWaterLevel including version identification, for example year of issue or period.

Attribute Type: Text

Indication: Name of water level (c...): String of characters.

Format: c...

Example: HSW 2020

Remarks:

No remarks.

27.186 name of relevant low water level (lownam)

IHO Definition: Name of the water level, which is used for the attribute valueAtRelevantLowWaterLevel including version identification, for example year of issue or period.

Attribute Type: Text

Indication: Name of water level (c...): String of characters.

Format: c...

Example: RNW 2020

Remarks:

No remarks.

27.187 name of relevant mean water level (meanam)

IHO Definition: Name of the water level, which is used for the attribute valueAtRelevantMeanWaterLevel including version identification, for example year of issue or period.

Attribute Type: Text

Indication: Name of water level (c...): String of characters.

Format: c...

Example: MW 2020

Remarks:

No remarks.

27.188 name of resource

IHO Definition: **NAME OF RESOURCE.** Name of the online resource. (ISO 19115).

Attribute Type: Text

Indication: String of characters.

Format: c...

Example: International Hydrographic Organization**Remarks:**

- The attribute **name of resource** encodes the name of an online resource. The URL/URI for accessing the resource is populated using the attribute **linkage**.
- The attribute **name of resource** should contain no more than 100 characters.

27.189 name usage

IHO Definition: **NAME USAGE.** Classification of the type and display level of the name of a feature in an end-user system.

Attribute Type: Enumeration

default name display

IHO Definition: The name is intended to be displayed when the end-user system is set to the default name/text display setting.

alternate name display

IHO Definition: The name is intended to be displayed when the end-user system is set to an alternate name/text display setting, for example an alternate language.

Remarks:

- For Inland ECDIS or ECS, all encoded instances of the complex attribute **feature name** will be able to be viewed in the Inland ECDIS or ECS Pick Report, regardless of the value populated for **name usage**.

27.190 name of sounding datum reference level (sdrlev)

IHO Definition: Name of the water level depth values are referred to.

Attribute Type: Text

Indication: Name of sounding datum reference level (c...): String of characters.

Format: c...

Example: **reference low water level**

Remarks:

No remarks.

27.191 name of vertical river datum reference level (vcrlev)

IHO Definition: Name of the water level vertical clearance values are referred to.

Attribute Type: Text

Indication: Name of reference level for vertical measurements (c...): String of characters.

Format: c...

Example: **highest shipping height of water according to Danube Commission 2020**

Remarks:

- Name of reference level to which vertical clearances are referred (from **vertical datum** (verdat) list) plus version indication), e.g., HSW 2002

27.192 nationality (NATION)

IHO Definition: **NATIONALITY.** Identifier of membership of a particular nation. (Derived from Merriam-Webster Dictionary – 2018).

Attribute Type: Text

Indication: The nationality is encoded by a 2 character code following ISO 3166 (refer to S-57 Appendix A).

Format: c2 (mandatory)

Example: **AU** for Australia

US for the United States of America

Remarks:

- The attribute “nationality” indicates the nationality of the specific feature.
- Where it is required to encode multiple nationalities relevant to a single feature (for example, for a maritime jurisdiction area that is in dispute between two Coastal States), this must be done by populating multiple instances of **nationality**.

27.193 nature of construction (NATCON)

IHO Definition: **NATURE OF CONSTRUCTION.** The building’s primary construction material.

Attribute Type: Enumeration

1) **masonry**

IHO Definition: Constructed of stones or bricks, usually quarried, shaped, and mortared. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

2) **concreted**

IHO Definition: Constructed of concrete, a material made of sand and gravel that is united by cement into a hardened mass used for roads, foundations, etc. (Adapted from the Illustrated Contemporary Dictionary, Encyclopedic Edition, 1978).

3) **loose boulders**

IHO Definition: Constructed from large stones or blocks of concrete, often placed loosely for protection against waves or water turbulence. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.152, November 2000).

4) **hard surfaced**

IHO Definition: Constructed with a surface of hard material, usually a term applied to roads surfaced with asphalt or concrete. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.152, November 2000).

5) **unsurfaced**

IHO Definition: Constructed with no extra protection, usually a term applied to roads not surfaced with a hard material. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.152, November 2000).

6) **wooden**

IHO Definition: Constructed from wood. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.152, November 2000).

7) **metal**

IHO Definition: Constructed from metal. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.152, November 2000).

8) **glass reinforced plastic**

IHO Definition: Constructed from a plastic material strengthened with fibres of glass. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.152, November 2000).

9) painted

IHO Definition: The application of paint to some other construction or natural feature.(IHO Transfer Standard for Digital Hydrographic Data, Appendix A: Object Catalogue - Description of the Feature Coding Schema to be Used for Hydrographic Requirements)

11) latticed

IHO Definition: A structure of crossed wooden or metal strips usually arranged to form a diagonal pattern of open spaces between the strips.

12) glass

IHO Definition: 1. Any artificial or natural substance having similar properties and composition, as fused borax, obsidian, or the like. 2. Something made of such a substance, as a windowpane.

Remarks:

No remarks.

27.194 nature of surface (NATSUR)

IHO Definition: **NATURE OF SURFACE.** The general material which the land surface or the seabed is composed.

Attribute Type: Enumeration**1) mud**

IHO Definition: Soft, wet earth. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.153, November 2000).

2) clay

IHO Definition: (Particles of less than 0.002mm); stiff, sticky earth that becomes hard when baked. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.153, November 2000).

3) silt

IHO Definition: An unconsolidated sediment whose particles range in size from 0.0039 to 0.0625 millimetres in diameter (between clay and sand size). (IHO Dictionary – S-32).

4) sand

IHO Definition: Loose material consisting of small but easily distinguishable, separate grains, between 0.0625 and 2.000 millimetres in diameter. (IHO Dictionary – S-32).

5) stone

IHO Definition: A general term for rock and rock fragments ranging in size from pebbles and gravel to boulders or large rock masses. (IHO Dictionary – S-32).

6) gravel

IHO Definition: (Particles of 2.0 - 4.0mm); small stones with coarse sand. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.153, November 2000).

7) pebbles

IHO Definition: A small stone worn smooth and rounded by the action of water, sand, ice, etc. ranging in diameter between 4 and 64 millimetres. (IHO Dictionary – S-32).

8) cobbles

IHO Definition: A naturally rounded stone larger than a pebble. (IHO Dictionary – S-32).

9) rock

IHO Definition: Any formation of natural origin that constitutes an integral part of the lithosphere. The natural occurring material that forms firm, hard, and solid masses. (Adapted from IHO Dictionary – S-32).

11) lava

IHO Definition: The fluid or semi-fluid matter flowing from a volcano. The substance that results from the cooling of the molten rock. Part of the ocean bed is composed of lava. (IHO Dictionary – S-32).

14) coral

IHO Definition: Hard calcareous skeletons of many tribes of marine polyps. (IHO Dictionary – S-32).

17) shells

IHO Definition: The hard outside covering of an animal. Part of the ocean bed is composed of numerous shells of marine animals. (IHO Dictionary – S-32).

18) boulder

IHO Definition: A rounded rock with diameter of 256 millimetres or larger. (Adapted from IHO Dictionary – S-32).

Remarks:

- The attribute “nature of surface” encodes the general nature of the material of which the land surface or the seabed is composed.
- Mixed bottom: where the seabed comprises a mixture of material, the main constituent is given first for example fine sand with mud and shells would be indicated as 4,1,17.
- Mud, sand, stone, rock are terms used for the general description. Clay, silt, gravel, pebbles, cobbles are more specific terms related to particle size.

27.195 nature of surface – qualifying terms (NATQUA)

IHO Definition: **NATURE OF SURFACE – QUALIFYING TERMS.** The nature of various forms of natural surface materials in terms of their size, morphology and consistency.

Attribute Type: Enumeration

1) fine

IHO Definition: Falls within the smallest size continuum for a particular nature of surface term. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.155, November 2000).

2) medium

IHO Definition: Falls within the moderate size continuum for a particular nature of surface term. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.155, November 2000).

3) coarse

IHO Definition: Falls within the largest size continuum for a particular nature of surface term. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.155, November 2000).

4) broken

IHO Definition: Fractured or in pieces. (Adapted from Webster's II New Riverside Dictionary, 1984).

5) sticky

IHO Definition: Having an adhesive or glue like property. (Adapted from Webster's II New Riverside Dictionary, 1984).

6) soft

IHO Definition: Not hard or firm. (Adapted from Webster's II New Riverside Dictionary, 1984).

7) stiff

IHO Definition: Not pliant; thick, resistant to flow. (Adapted from Webster's II New Riverside Dictionary, 1984).

8) volcanic

IHO Definition: Composed of or containing material ejected from a volcano. (Adapted from Webster's II New Riverside Dictionary, 1984).

9) **calcareous**

IHO Definition: Composed of or containing calcium or calcium carbonate. (IHO Dictionary – S-32).

10) **hard**

IHO Definition: Firm; usually refers to an area of the seafloor not covered by unconsolidated sediment. (IHO Dictionary – S-32 and adapted from Webster's II New Riverside Dictionary, 1984).

Remarks:

- The attribute “nature of surface - qualifying terms” encodes the nature of various forms of natural surface materials in terms of their size, morphology and consistency.

27.196 number of features

IHO Definition: **NUMBER OF FEATURES.** The number of features of identical character that exist as a co-located group. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.150, November 2000).

Attribute Type: Integer

Unit: None

Minimum range: 2

Range closure: Left closed ray (*minimum ≤ number of features*)

Example: 3 for 3 co-located cables

Remarks:

- The attribute **number of features** must only be used to indicate the number of entities of a feature, where known, that are co-located (for example 3 overhead cables suspended over a body of water between 2 pylons), and this information is considered to be of use to the boatmaster. Where possible, features must be encoded individually.

27.197 number of shore connectors

IHO Definition: The number of shore connectors available at the power supply station.

Attribute Type: Integer

Minimum range: 1

Example: 4 for 4 shore connectors

Remarks:

No remarks.

27.198 opening bridge (CATBRG)

IHO Definition: **OPENING BRIDGE.** A bridge that is closed when set for carrying road traffic and open when set to permit marine traffic to pass through the waterway it crosses. Modern opening (movable) bridges are either bascule, vertical lift or swing. (Adapted from McGraw-Hill Encyclopedia of Science and Technology, 7th Edition, 1992).

Attribute Type: Boolean

Indication: A True value is an indication that one or more spans of the bridge are opening.

Remarks:

No remarks.

27.199 orientation value (ORIENT)

IHO Definition: **ORIENTATION VALUE.** The angular distance measured from true north to the major axis of the feature. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

Attribute Type: Real

Unit: Degree (°)

Precision: 0·01°

Minimum range: 0

Maximum range: 360

Range closure: Right half-open interval (*minimum ≤ orientation value < maximum*)

Example: 246.7 for an orientation value of 246·7 degrees

Remarks:

- An orientation quoted as 360° must be encoded as 0.

27.200 pictorial representation (PICREP)

IHO Definition: **PICTORIAL REPRESENTATION.** The file name of an externally referenced picture file. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.209, November 2000).

Attribute Type: Text

Indication: For S-401, the string encodes the file name of a single pictorial IENC support file (pixel/vector).

Format: 101CCCC000000000000.EEE (See S-401 Main document, clause 11.4.3 (mandatory))

Remarks:

- The attribute **pictorial representation** indicates that a file containing an image is available.
- The “pictorial representation” image can, for example, be a drawing or a photo.
- The files referenced by **pictorial representation** must be .TIF or .JPG (see clause 2.4.12.2).

27.201 pilot movement

IHO Definition: **PILOT MOVEMENT.** Classification of pilot activity by arrival, departure, or change of pilot. It may also describe the place where the pilot's advice begins, ends, or is transferred to a different pilot.

Attribute Type: Enumeration

1) embarkation

IHO Definition: The place where vessels not being navigated according to a pilot's instructions pick up a pilot while in transit from sea to a port or constricted waters for future navigation under pilot instructions.

2) disembarkation

IHO Definition: The place where vessels being navigated under a pilot's instructions in transit from sea to a port or constricted waters drop the pilot and proceed without being subject to pilot instructions.

3) pilot change

IHO Definition: The place where vessels being navigated under a pilot's instructions drop off the pilot and pick up a different pilot for future navigation under pilot's instructions.

Remarks:

No remarks.

27.202 postal code

IHO Definition: **POSTAL CODE.** Known in various countries as a postcode, or ZIP code, the postal code is a series of letters and/or digits that identifies each postal delivery area.

Attribute Type: Text

Remarks:

- The attribute **postal code** should contain no more than 20 characters.

27.203 product (PRODCT)

IHO Definition: **PRODUCT.** The various substances which are transported, stored or exploited.

Attribute Type: Enumeration

1) **oil**

IHO Definition: A thick, slippery liquid that will not dissolve in water, usually petroleum based in the context of storage tanks. (Adapted from the Oxford Minidictionary, Third Edition).

2) **gas**

IHO Definition: A substance with particles that can move freely, usually a fuel substance in the context of storage tanks. (Adapted from the Oxford Minidictionary, Third Edition).

3) **water**

IHO Definition: A colourless, odourless, tasteless liquid that is a compound of hydrogen and oxygen. (Adapted from the Oxford Minidictionary, Third Edition).

4) **stone**

IHO Definition: A general term for rock and rock fragments ranging in size from pebbles and gravel to boulders or large rock masses. (IHO Dictionary – S-32).

5) **coal**

IHO Definition: A hard black mineral that is burned as fuel. (Adapted from the Oxford Minidictionary, Third Edition).

6) **ore**

IHO Definition: A solid rock or mineral from which metal is obtained. (Adapted from the Oxford Minidictionary, Third Edition).

7) **chemicals**

IHO Definition: Any substance obtained by or used in a chemical process. (Adapted from the Oxford Minidictionary, Third Edition).

8) **drinking water**

IHO Definition: Water that is suitable for human consumption. (Adapted from the Oxford Minidictionary, Third Edition).

9) **milk**

IHO Definition: A white fluid secreted by female mammals as food for their young. (Adapted from the Oxford Minidictionary, Third Edition).

10) **bauxite**

IHO Definition: A mineral from which aluminum is obtained. (Adapted from the Oxford Minidictionary, Third Edition).

11) **coke**

IHO Definition: A solid substance obtained after gas and tar have been extracted from coal, used as a fuel. (Adapted from the Oxford Minidictionary, Third Edition).

12) iron ingots

IHO Definition: An oblong lump of cast iron metal. (Adapted from the Oxford Minidictionary, Third Edition).

13) salt

IHO Definition: Sodium chloride obtained from mines or by the evaporation of sea water. (Adapted from the Oxford Minidictionary, Third Edition).

14) sand

IHO Definition: Loose material consisting of small but easily distinguishable, separate grains, between 0.0625 and 2.000 millimetres in diameter. (IHO Dictionary – S-32).

15) timber

IHO Definition: Wood prepared for use in building or carpentry. (Adapted from the Oxford Minidictionary, Third Edition).

16) sawdust/wood chips

IHO Definition: Powdery fragments of wood made in sawing timber or coarse chips produced for use in manufacturing pressed board. (Adapted from the Oxford Minidictionary, Third Edition).

17) scrap metal

IHO Definition: Discarded metal suitable for being reprocessed. (Adapted from the Oxford Minidictionary, Third Edition).

18) liquefied natural gas

IHO Definition: Natural gas that has been liquefied for ease of transport by cooling the gas to -162 Celsius. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

19) liquefied petroleum gas

IHO Definition: A compressed gas consisting of flammable light hydrocarbons and derived from petroleum. (Adapted from the Websters New World Dictionary).

20) wine

IHO Definition: The fermented juice of grapes. (Adapted from the Websters New World Dictionary).

21) cement

IHO Definition: A substance made of powdered lime and clay, mixed with water. (Adapted from the Websters New World Dictionary).

22) grain

IHO Definition: A small hard seed, especially that of any cereal plant such as wheat, rice, corn, rye etc. (Adapted from the Websters New World Dictionary).

23) electricity

IHO Definition: Electric charge or current.

24) ice

IHO Definition: The solid form of water. (IHO Dictionary – S-32).

25) clay

IHO Definition: (Particles of less than 0.002mm); stiff, sticky earth that becomes hard when baked. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.153, November 2000).

Remarks:

- The attribute “product” encodes the various substances which are transported, stored or exploited.

27.204 publication reference (lg_pbr)

IHO Definition: Waterway or waterway section for which a juridical regulation with respect to the maximum permitted vessel dimensions exists.

Attribute Type: Text

Remarks:

No remarks.

27.205 radar band

IHO Definition: **RADAR BAND**. The band code character of the electromagnetic spectrum within which radar wave lengths lie.

Attribute Type: Text

Indication: Radar band (C).

Format: C (mandatory)

Example: X for the (X) - Band.

Remarks:

- Radar transponder beacons generally work on the 3cm (X) – Band or the 10cm (S) – Band wave lengths. Nevertheless, wave lengths outside the marine band are used.

27.206 radar conspicuous (CONRAD)

IHO Definition: **RADAR CONSPICUOUS**. A feature which returns a strong radar echo. (IHO Dictionary, S-32).

Attribute Type: Boolean

Indication: A True value is an indication that the feature returns a strong radar echo.

Default value: False

Remarks:

- **Radar conspicuous** applies to both features that themselves provide a strong radar echo; or return a strong radar echo as a result of being fitted with a radar reflector or a Radar Target Enhancer.

27.207 radius (RADIUS)

IHO Definition: **RADIUS**. The vector extending from the centre to the periphery of a circular or spherical feature. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.173, November 2000).

Attribute Type: Real

Unit: Defined as an attribute in the IENC dataset metadata: metre (m)

Precision: 0·1m

Minimum range: 0

Range closure: Left half-open ray (*minimum < radius*)

Example: 26 for a radius of 26 metres

Remarks:

No remarks.

27.208 reference gauge (refgag)

IHO Definition: The ISRS code of the gauge, or the acronym of the gauge, which can be used to calculate the vertical clearance.

Attribute Type: Text

Example: urn:mrn:iehg:uuid:123e4567-e89b-12d3-a456-42661417400

Remarks:

- EUR: If there is a gauge which can be used to do a reliable calculation of the vertical clearance of the referred feature under all navigation conditions, the ISRS Location Code of the gauge shall be encoded in the attribute **reference gauge** (refgag). When the attribute **interoperability identifier** of the gauge has been encoded (see **Fehler! Verweisquelle konnte nicht gefunden werden.**), the MRN of the gauge shall be encoded in the attribute **reference gauge** (refgag).
- US: If there is a gauge which can be used to calculate the vertical clearance of the referred feature, the gauge name acronym shall be encoded in the attribute **reference gauge** (refgag).

27.209 reference gravitational level

IHO Definition: Gravitational reference level.

1) Baltic Datum

IHO Definition: The unified State system for absolute heights reckoning from Kronshtadt Tide-gauge Datum that is accepted in Russian Federation.

2) Adriatic Level

IHO Definition: The average height of the surface of the Adriatic Sea at the tide station of Trieste in Italy.

3) Amsterdam Ordnance Datum (NAP)

IHO Definition: Dutch gravitational reference level that is approximately the average summer height of the North Sea.

4) Mean Sea Level

IHO Definition: The average height of the surface of the sea at a tide station for all stages of the tide over a 19-year period, usually determined from hourly height readings measured from a fixed predetermined reference level.

5) Other Datum

IHO Definition: Other gravitational reference level.

6) National Geodetic Vertical Datum - NGVD29

IHO Definition: The name, after May 10, 1973, of the Sea Level Datum of 1929.

7) North American Vertical Datum - NAVD88

IHO Definition: The vertical control datum established in 1991 by the minimum-constraint adjustment of the Canadian-Mexican-U.S. leveling observations.

8) Mean Sea Level 1912

IHO Definition: A vertical control datum established for vertical control in the United States by the general adjustment of 1912.

9) Mean Sea Level 1929

IHO Definition: A vertical control datum established for vertical control in the United States by the general adjustment of 1929.

10) Tweede Algemene Waterpassing

IHO Definition: All heights in Belgium are referenced to TAW.

Remarks:

No remarks.

27.210 reference location

IHO Definition: **REFERENCE LOCATION**. Information relating to the point of origin for a measured distance as indicated on a distance mark.

Attribute Type: Text

Indication: Reference location (c...).

Format: c...

Example: **Storey Bridge** for a distance mark marking a specified distance from Storey Bridge.

Remarks:

- The attribute **reference location** should contain no more than 75 characters.

27.211 reference tide

IHO Definition: **REFERENCE TIDE**. The reference tide to which the series of tidal stream values apply.

Attribute Type: Enumeration

1) **high water**

IHO Definition: The highest level reached at a place by the water surface in one oscillation. (IHO Dictionary – S-32).

2) **low water**

IHO Definition: The lowest level reached at a place by the water surface in one oscillation. (IHO Dictionary – S-32).

Remarks:

No remarks.

27.212 reference tide type

IHO Definition: **REFERENCE TIDE TYPE**. The type of tide range (that is, mean spring tide, mean neap tide or mean tide) for which a set of tidal stream rates and directions apply.

Attribute Type: Enumeration

1) **springs**

IHO Definition: The tides of increased range occurring near the times of full moon and new moon. (IHO Dictionary, S-32).

2) **neaps**

IHO Definition: The tides of decreased range occurring near the times of first and last quarter.

3) **mean**

IHO Definition: The tides of mean range occurring between spring and neap tides.

Remarks:

No remarks.

27.213 reference year for magnetic variation (RYRMGV)

IHO Definition: **REFERENCE YEAR FOR MAGNETIC VARIATION.** The reference calendar year for magnetic variation values. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.176, November 2000).

Attribute Type: Truncated date

Unit: Four digit year indication (YYYY)

Format: YYYY----

Example: 2009----

Remarks:

- The dashes (----) must be included in all cases.

27.214 regulation citation

IHO Definition: **REGULATION CITATION.** The regulation citation for a feature.

Attribute Type: Text

Indication: Regulation citation (c...).

Format: c...

Example: CFR 33.88.810

Remarks:

- The attribute **regulation citation** should contain no more than 50 characters.

27.215 related issue (lg_rel)

IHO Definition: Indication of the related legal issue.

1) Other

IHO Definition: Being the one or ones distinct from that or those first mentioned or implied.

2) Usage of Waterway

IHO Definition: An issue that is related to the usage of the waterway.

3) Carriage of Equipment

IHO Definition: The legal issue for the vessel is related to the carriage of equipment.

4) Task, Operation

IHO Definition: A usually assigned piece of work, or a specific work process, often to be finished within a certain time.

Remarks:

No remarks.

27.216 reported date (SORDAT)

IHO Definition: **REPORTED DATE.** The date that the item was observed, done, or investigated.

Attribute Type: Truncated date

Indication: Dates should be encoded using 4 digits for the calendar year (YYYY), 2 digits for the month (MM) (for example April = 04) and 2 digits for the day (DD). When no specific year, month and/or day is

required/known, indication of the year, month and/or day is omitted, and replaced with dashes (-). See also clause 2.4.8.

Example: **20101129** for 29 November 2010 as the reported date.

Remarks:

- The attribute **reported date** indicates the date that information regarding a feature has been supplied to a Producing Authority.

27.217 restriction (RESTRN)

IHO Definition: **RESTRICTION**. The official legal statute of each kind of restricted area. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.179, November 2000).

Attribute Type: Enumeration

1) anchoring prohibited

IHO Definition: An area within which anchoring is not permitted. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.177, November 2000).

2) anchoring restricted

IHO Definition: A specified area designated by appropriate authority, within which anchoring is restricted in accordance with certain specified conditions. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.177, November 2000).

3) fishing prohibited

IHO Definition: An area within which fishing is not permitted. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.177, November 2000).

4) fishing restricted

IHO Definition: A specified area designated by appropriate authority, within which fishing is restricted in accordance with certain specified conditions. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.177, November 2000).

5) trawling prohibited

IHO Definition: An area within which trawling is not permitted. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.177, November 2000).

6) trawling restricted

IHO Definition: A specified area designated by appropriate authority, within which trawling is restricted in accordance with certain specified conditions. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.178, November 2000).

7) entry prohibited

IHO Definition: An area within which navigation and/or anchoring is prohibited. (Adapted from IHO Dictionary – S-32).

8) entry restricted

IHO Definition: A specified area designated by appropriate authority, within which navigation is restricted in accordance with certain specified conditions. (Adapted from IHO Dictionary – S-32).

9) dredging prohibited

IHO Definition: An area within which dredging is not permitted. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.178, November 2000).

10) dredging restricted

IHO Definition: A specified area designated by appropriate authority, within which dredging is restricted in accordance with certain specified conditions. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.178, November 2000).

11) diving prohibited

IHO Definition: An area within which diving is not permitted. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.178, November 2000).

12) diving restricted

IHO Definition: A specified area designated by appropriate authority, within which diving is restricted in accordance with certain specified conditions. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.178, November 2000).

13) no wake

IHO Definition: Mariners must adjust the speed of their vessels to reduce the wave or wash which may cause erosion or disturb moored vessels. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.178, November 2000).

14) area to be avoided

IHO Definition: An IMO declared routeing measure comprising an area within defined limits in which either navigation is particularly hazardous or it is exceptionally important to avoid casualties and which should be avoided by all ships, or certain classes of ships. (Adapted from IHO Dictionary – S-32).

15) construction prohibited

IHO Definition: The erection of permanent or temporary fixed structures or artificial islands is prohibited. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.178, November 2000).

16) discharging prohibited

IHO Definition: An area within which discharging or dumping is prohibited. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.178, November 2000).

17) discharging restricted

IHO Definition: A specified area designated by an appropriate authority, within which discharging or dumping is restricted in accordance with specified conditions. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.178, November 2000).

18) industrial or mineral exploration/development prohibited

IHO Definition: An area within which industrial or mineral exploration and development are prohibited. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.178, November 2000).

19) industrial or mineral exploration/development restricted

IHO Definition: A specified area designated by an appropriate authority, within which industrial or mineral exploration and development is restricted in accordance with certain specified conditions. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.178, November 2000).

20) drilling prohibited

IHO Definition: An area within which excavating a hole on the seabed with a drill is prohibited. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.178, November 2000).

21) drilling restricted

IHO Definition: A specified area designated by an appropriate authority, within which excavating a hole on the seabed with a drill is restricted in accordance with certain specified conditions. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.178, November 2000).

22) removal of historical artefacts prohibited

IHO Definition: An area within which the removal of historical artefacts is prohibited. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.178, November 2000).

23) cargo transhipment (lightening) prohibited

IHO Definition: An area in which cargo transhipment (lightening) is prohibited. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.178, November 2000).

24) dragging prohibited

IHO Definition: An area in which the dragging of anything along the seabed, for example bottom trawling, is prohibited. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.178, November 2000).

25) stopping prohibited

IHO Definition: An area in which a vessel is prohibited from stopping. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.178, November 2000).

26) landing prohibited

IHO Definition: An area in which landing is prohibited. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.179, November 2000).

27) speed restricted

IHO Definition: An area within which speed is restricted. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.179, November 2000).

28) overtaking prohibited

IHO Definition: A specified area designated by appropriate authority, within which overtaking is generally prohibited.

29) overtaking of convoys by convoys prohibited

IHO Definition: A specified area designated by appropriate authority, within which overtaking between convoys is prohibited.

30) passing or overtaking prohibited

IHO Definition: A specified area designated by appropriate authority, within which passing or overtaking is generally prohibited.

31) berthing prohibited

IHO Definition: A specified area designated by appropriate authority, within which vessels, assemblies of floating material or floating establishments may not berth.

32) berthing restricted

IHO Definition: A specified area designated by appropriate authority, within which berthing is restricted.

33) making fast prohibited

IHO Definition: A specified area designated by appropriate authority, within which vessels, assemblies of floating material or floating establishments may not make fast to the bank.

34) making fast restricted

IHO Definition: A specified area designated by appropriate authority, within which making fast to the bank is restricted.

35) turning prohibited

IHO Definition: A specified area designated by appropriate authority, within which all turning is generally prohibited.

36) restricted fairway depth

IHO Definition: An area within which the fairway depth is restricted.

37) restricted fairway width

IHO Definition: An area within which the fairway width is restricted.

38) use of spuds prohibited

IHO Definition: The use of anchoring spuds (telescopic piles) is prohibited.

39) **swimming prohibited**

IHO Definition: An area in which swimming is prohibited.

40) **SOx emission restricted**

IHO Definition: An area within which the emission of SOx is restricted.

41) **NOx emission restricted**

IHO Definition: An area within which the emission of NOx is restricted.

42) **power-driven vessels prohibited**

IHO Definition: An area within which any vessel propelled by machinery is prohibited. (Adapted from Convention on the International Regulations for Preventing Collisions at Sea, 1972).

43) **passing or overtaking of convoys by convoys prohibited**

IHO Definition: A specified area designated by appropriate authority, within which passing or overtaking of convoys by convoys is prohibited
Remarks:

- The official legal status of each kind of restricted area defines the kind of restriction(s), for example the restriction for a "game preserve" may be "entry prohibited", the restriction for a "fish sanctuary" may be "fishing restricted".
- The complete information about the restriction(s), actually held in handbooks or other publications, may be encoded using the complex attribute **information** (see clause 2.4.6), sub-attribute **file reference**. A short explanation may be given by the use of **information**, sub-attribute **text**.

27.218 scale minimum (SCAMIN)

IHO Definition: **SCALE MINIMUM.** The minimum scale at which the feature may be used for example for ECDIS presentation.

Attribute Type: Integer

Indication: The modulus of the scale is indicated, that is 1:89 999 is encoded as 89999.

Unit: None

Minimum range: 999

Maximum range: 19999999

Range closure: Closed interval (*minimum ≤ scale minimum ≤ maximum*)

Example: If a particular minimum scale is specified as 1:89 999 (encoded as **89999**), and an example of a smaller scale would be 1:179 999 (encoded as **179999**).

The **scale minimum** value of a feature determines the display scale below which the feature is no longer displayed. Its purpose is to reduce clutter, to prioritise the display of features and to improve display speed. In encoding its value, the producing authority should consider these factors, as well as the scale at which the feature is no longer likely to be required for navigation.

In order to optimize the performance and clarity of the IENC, it is a mandatory requirement on IENCs that **scale minimum** is used.

Remarks:

- **scale minimum** only affects the display of a feature on an Inland ECDIS or ECSD, not its presence in the Electronic Navigational Data Service (ENDS).
- If **scale minimum** is not encoded, the feature is displayed at all scales.
- Where **scale minimum** is used, it must always be set to a scale less (that is, to a smaller scale) than the optimum display scale of the data as described in clause 2.5.5. Failure to follow this rule will mean that features will not be displayed on the Inland ECDIS or ECS until the overscale indication is activated. See clause 2.5.9, Table 2-6, for the list of mandatory **scale minimum** values.

- Skin of the Earth and Meta features must always be displayed. Therefore, **scale minimum** must not be encoded on Skin of the Earth and Meta features.
- If the same feature exists in datasets of different optimum display scales, the same **scale minimum** value must be assigned to each occurrence of the feature.

27.219 sector bearing (**SECTR1**, **SECTR2**)

IHO Definition: **SECTOR BEARING.** A sector is the part of a circle between two straight lines drawn from the centre to the circumference. (Advanced Learner's Dictionary, 2nd Edition).

sector bearing specifies the limit of the sector. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.184, November 2000).

Attribute Type: Real

Unit: Degree (°)

Precision: 0.01°

Minimum range: 0

Maximum range: 360

Range closure: Right half-open interval (*minimum ≤ sector bearing < maximum*)

Example: 125 for a sector bearing of 125 degrees

Remarks:

- The values given to the common limits of adjacent sectors should be identical.
- The orientation of the bearing is from seaward to the central feature. This conforms with the method used in "List of Lights" publications.
- An orientation quoted as 360° must be encoded as 0.
- A generic term such as "to shore" cannot be used; a specific bearing must be encoded. Where a light sector limit is defined as "to the shore", it should be encoded using a value that ensures that, when the limit is drawn, it will fall entirely on land.

27.220 sector line length

IHO Definition: **SECTOR LINE LENGTH.** A sector is the part of a circle between two straight lines drawn from the centre to the circumference. (Advanced Learner's Dictionary, 2nd Edition).

sector line length specifies the displayed length of the line, in ground units, defining the limit of the sector.

Attribute Type: Real

Unit: Nautical mile (M)

Precision: 0.01M

Minimum range: 0

Range closure: Left half-open ray (*minimum < sector line length*)

Example: 5.15 for a sector line length of 5.15 nautical miles

Remarks:

- The attribute **sector line length** is used to override the default sector line length in Inland ECDIS or ECS for light sectors that are considered to be particularly critical to safe navigation.
- Sector lines should be displayed such that they cover the area where they are useful to boatmasters.
- Sector lines must not extend beyond the nominal range of the light sector.

27.221 signal duration

IHO Definition: **SIGNAL DURATION.** The time occupied by a single instance of light/sound or eclipse/silence in a signal sequence.

Attribute Type: Real

Unit: Seconds (s)

Precision: 0·01s

Minimum range: 0

Maximum range: 60

Range closure: Left half-open interval (*minimum < signal duration ≤ maximum*)

Example: 2.5 for an duration of 2.5 seconds

Remarks:

No remarks.

27.222 signal frequency (SIGFRQ)

IHO Definition: **SIGNAL FREQUENCY.** The frequency of a signal. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.187, November 2000).

Attribute Type: Integer

Unit: Hertz (Hz)

Minimum range: 0

Range closure: Left half-open ray (*minimum < signal frequency*)

Example: 950000000 for a radio signal centred on 950 MHz

Remarks:

No remarks.

27.223 signal generation (SIGGEN)

IHO Definition: **SIGNAL GENERATION.** The mechanism used to generate a fog or light signal.

Attribute Type: Enumeration

1) **automatically**

IHO Definition: Signal generation is initiated by a self regulating mechanism such as a timer or light sensor. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.188, November 2000).

2) **by wave action**

IHO Definition: The signal is generated by the motion of the sea surface such as a bell in a buoy. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.188, November 2000).

3) **by hand**

IHO Definition: The signal is generated by a manually operated mechanism such as a hand cranked siren. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.188, November 2000).

4) **by wind**

IHO Definition: The signal is generated by the motion of air such as a wind driven whistle. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.188, November 2000).

5) **radio activated**

IHO Definition: Activated by radio signal.

6) call activated

IHO Definition: Activated by making a call to a manned station.

Remarks:

- The attribute “signal generation” encodes the mechanism used to generate a fog signal.

27.224 signal group (SIGGRP)

IHO Definition: **SIGNAL GROUP.** The number of signals, the combination of signals or the Morse character(s) within one period of full sequence. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.189, November 2000).

Attribute Type: Text

Indication: The signal group of a light is encoded using brackets to separate the individual groups. A group of signals may be a single number, a chain of numbers separated by "+", a sequence of up to 4 letters or a letter and a number.

A fixed light has no signal group.

Where no specific signal group is given for one of the light characteristics, this should be shown by an empty pair of brackets.

Format: (c)(c)...

Examples:

<u>Light Characteristic</u>	<u>Signal Group</u>
VQ(6)+LFI	-> (6)(1)
LFI+FI(2+3)	-> (1)(2+3)
FI(2)+LFI	-> (2)(1)
FFI	-> ()(1)
Mo(AA)	-> (AA)
AIFI(2W+1R)	-> (2+1)
AILFIWR	-> (1)
FOcW	-> ()(1)
AI Oc(4)WR	-> (4)
AIWR	-> ()
Iso	-> (1)
IQ	-> ()

Remarks:

- In the above examples, where there is more than one group included in the rhythm of the light (for example (6)(1)), each group is encoded using a separate instance of **signal group**; in this case the first instance of **signal group** would be (6) and the second instance would be (1).
- The attribute **signal group** should contain no more than 15 characters.

27.225 signal period (SIGPER)

IHO Definition: **SIGNAL PERIOD.** The time occupied by an entire cycle of intervals of light and eclipse. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.190, November 2000).

Attribute Type: Real

Unit: Seconds (s)

Precision: 0.01s

Minimum range: 0

Maximum range: 120

Range closure: Left half-open interval (*minimum < signal period ≤ maximum*)

Example: 12 for an interval of 12 seconds

Remarks:

No remarks.

27.226 signal status

IHO Definition: **SIGNAL STATUS**. The indication of an element of a signal sequence being a period of light/sound or eclipse/silence.

Attribute Type: Enumeration

1) **lit/sound**

IHO Definition: The indication of an element of a signal sequence being a period of light or sound.

2) **eclipsed/silent**

IHO Definition: The indication of an element of a signal sequence being a period of eclipse or silence.

Remarks:

No remarks.

27.227 sounding datum reference level value

IHO Definition: Local value of the sounding datum reference level.

Attribute Type: Real

Unit: metre (m).

Precision: 0·1m

Minimum range: 0.0

Example: 4.5 for a sounding datum reference level of 4.5 m

Remarks:

No remarks.

27.228 Source (SORIND)

IHO Definition: **SOURCE**. The publication, document, or reference work from which information comes or is acquired.

Attribute Type: Text

Indication: String of characters.

Example: Public law No. 123/2025

Remarks:

- May be populated with the corresponding paper chart Notice to Mariners numbers, although other references are permitted.
- The attribute **source** should contain no more than 150 characters.

Inland specific encoding Instructions:

US: The format is: 2 character country code, 2 character authority code, 5 character source code, identifier (no restriction on number of characters).

- Examples:
 - For navigation features reference an authority such as the USCG Mississippi River System Light List, Volume 5: (US,U3,MS_LL,2004_Edition_No.808)
 - For hydrographic features reference appropriate survey: (US,U3,SURVY,2001_Hydro_Survey)
 - For other features reference appropriate survey data: (US,U3,SURVY,1999_Aerial_Survey)

EUR: The format is: 2 character country code, other codes (no restriction on number of characters). All other coding is at the decision of the local authority.

BR: The format is: 2 character country code, description of the responsible authority (no restriction on number of characters).

27.229 source date

IHO Definition: The production date of the source; for example the date of measurement.

Attribute Type: Truncated date

Indication: Dates should be encoded using 4 digits for the calendar year (YYYY), 2 digits for the month (MM) (for example April = 04) and 2 digits for the day (DD). See also clause 2.4.8.

Format: YYYYMMDD (full date)

Example: 20101129 for 29 November 2010

Remarks:

No remarks.

27.230 source type

IHO Definition: Type of the source.

1) Law or Regulation

IHO Definition: Treaty, convention, or international agreement; law or regulation issued by a national or other authority.

2) Official Publication

IHO Definition: Publication not having the force of law, issued by an international organisation or a national or local administration.

7) Mariner Report, Confirmed

IHO Definition: Reported by mariner(s) and confirmed by another source.

8) Mariner Report, Not Confirmed

IHO Definition: Reported by mariner(s) but not confirmed.

9) Industry Publications and Reports

IHO Definition: Shipping and other industry publications, including graphics, charts and web sites.

10) Remotely Sensed Images

IHO Definition: Information obtained from satellite images.

11) Photographs

IHO Definition: Information obtained from photographs.

12) Products Issued by HO Services

IHO Definition: Information obtained from products issued by Hydrographic Offices.

13) News Media

IHO Definition: Information obtained from news media.

14) Traffic Data

IHO Definition: Information obtained from the analysis of traffic data.

Remarks:

No remarks.

27.231 speed limit

IHO Definition: **SPEED LIMIT**. The maximum allowed rate of travel in an area.

Attribute Type: Real

Unit: Knot (kt); or defined by complex attribute **vessel speed limit**, sub-attribute **speed units**.

Precision: 0·1

Minimum range: 0

Maximum range: 35

Range closure: Left half-open interval (*minimum < speed limit ≤ maximum*)

Example: 4.5 for a speed limit of 4.5 knots (or other speed unit of measure as defined by **speed units**)

Remarks:

No remarks.

27.232 speed maximum (CURVEL)

IHO Definition: **SPEED MAXIMUM**. Rate of motion. The terms speed and velocity are often used interchangeably, but speed is a scalar, having magnitude only, while velocity is a vector quantity, having both magnitude and direction. (Adapted from IHO Dictionary, S-32).

Speed maximum is the maximum rate of travel that can occur. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.121, November 2000).

Attribute Type: Real

Unit: Defined in **speed units** Precision: 0·1

Minimum range: 0

Maximum range: 35

Range closure: Left half-open interval (*minimum < speed maximum ≤ maximum*)

Example: 2.1 for a maximum speed of 2.1

Remarks:

No remarks.

27.233 speed minimum

IHO Definition: **SPEED MINIMUM**. Rate of motion. The terms speed and velocity are often used interchangeably, but speed is a scalar, having magnitude only, while velocity is a vector quantity, having both magnitude and direction. (Adapted from IHO Dictionary, S-32).

Speed minimum is the minimum rate of travel that can occur. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.121, November 2000).

Attribute Type: Real

Unit: Defined in **speed units**

Precision: 0·1

Minimum range: 0

Maximum range: 20

Range closure: Left half-open interval (*minimum < speed minimum ≤ maximum*)

Example: 1.6 for a maximum speed of 1·6

Remarks:

No remarks.

27.234 speed reference (lg_spr)

IHO Definition: Indicates the type of speed measurement.

1) Other

IHO Definition: Being the one or ones distinct from that or those first mentioned or implied.

2) Speed Over Ground

IHO Definition: The vessel's actual speed, determined by dividing the distance between successive fixes by the time between the fixes.

3) Speed Through Water

IHO Definition: The vessel's actual speed, determined by subtracting the speed over ground by the current speed.

Remarks:

No remarks.

27.235 speed units

IHO Definition: **SPEED UNITS.** The units for description of speed. (S-412 WMO Weather Product Specification, 2017).

Attribute Type: Enumeration

1) metres per second

IHO Definition: An SI derived unit of both speed (scalar) and velocity (vector quantity which specifies both magnitude and a specific direction), defined by distance in metres divided by time in seconds. (Wikipedia)

2) Kilometres per hour

IHO Definition: A unit of speed, expressing the number of kilometres travelled in one hour. (Wikipedia).

3) miles per hour

IHO Definition: An imperial and United States customary unit of speed expressing the number of statute miles covered in one hour. (Wikipedia).

4) knots

IHO Definition: A nautical unit of speed. One knot is one nautical mile per hour. The name is derived from the knots in the log line. (IHO Dictionary, S-32).

Remarks:

No remarks.

27.236 station name

IHO Definition: **STATION NAME.** The name of the reference tide station with reference water level for tidal stream panel observations.

Attribute Type: Text

Indication: Name of tidal stream station (c...): String of characters.

Format: c...

Example: **Darwin** for the Darwin tide station.

Remarks:

- The attribute **station name** should contain no more than 50 characters.

27.237 station number

IHO Definition: **STATION NUMBER.** The identification number of the reference tide station with reference water level for tidal stream panel observations.

Attribute Type: Text

Indication: The value indicates the reference number of a tide station as listed in national Tide Tables.

Format: c...

Example: **63230** for the reference number of Darwin tide station.

Remarks:

- The attribute **station number** should contain no more than 15 characters.

27.238 status (STATUS)

IHO Definition: **STATUS.** The condition of an object at a given instant in time.

Attribute Type: Enumeration

1) **permanent**

IHO Definition: Intended to last or function indefinitely. (The Concise Oxford Dictionary, 7th Edition).

2) **occasional**

IHO Definition: Acting on special occasions; happening irregularly. (The Concise Oxford Dictionary, 7th Edition).

3) **recommended**

IHO Definition: Presented as worthy of confidence, acceptance, use, etc. (The Macquarie Dictionary, 1988).

4) **not in use**

IHO Definition: Use has ceased, but the facility still exists intact; disused. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

5) **periodic/intermittent**

IHO Definition: Recurring at intervals. (The Concise Oxford Dictionary, 7th Edition).

6) **reserved**

IHO Definition: Set apart for some specific use. (Adapted from The Concise Oxford Dictionary, 7th Edition).

7) **temporary**

IHO Definition: Meant to last only for a time. (The Concise Oxford Dictionary).

8) **private**

IHO Definition: Administered by an individual or corporation, rather than a State or a public body. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

9) **mandatory**

IHO Definition: Compulsory; enforced. (The Concise Oxford Dictionary, 7th Edition).

11) **extinguished**

IHO Definition: No longer lit. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.197, November 2000).

12) **illuminated**

IHO Definition: Lit by flood lights, strip lights, etc. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.198, November 2000).

13) **historic**

IHO Definition: Famous in history; of historical interest. (The Concise Oxford Dictionary, 7th Edition).

14) **public**

IHO Definition: Belonging to, available to, used or shared by, the community as a whole and not restricted to private use. (Adapted from The New Shorter Oxford English Dictionary, 1993).

15) **synchronized**

IHO Definition: Occur at a time, coincide in point of time, be contemporary or simultaneous. (The New Shorter Oxford English Dictionary, 1993).

16) **watched**

IHO Definition: Looked at or observed over a period of time especially so as to be aware of any movement or change. (adapted from The New Shorter Oxford English Dictionary, 1993).

17) **unwatched**

IHO Definition: Usually automatic in operation, without any permanently-stationed personnel to superintend it. (Adapted from IHO Dictionary – S-32).

18) **existence doubtful**

IHO Definition: A feature that has been reported but has not been definitely determined to exist. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.198, November 2000).

28) **buoyed**

IHO Definition: Marked by buoys. (Australian Hydrographic Office).

Remarks:

No remarks.

27.239 stream depth

IHO Definition: **STREAM DEPTH.** The depth below the sea surface to which the tidal stream data refers relative to the sounding datum.

Attribute Type: Real

Unit: Defined as an attribute in the IENC dataset metadata: metre (m)

Precision: 0·1m

Minimum range: 0

Maximum range: 200

Range closure: Closed interval (*minimum ≤ stream depth ≤ maximum*)

Examples: **0** for surface tidal stream data
15 for tidal stream data collected at a depth of 15 metres

Remarks:
No remarks.

27.240 technique of vertical measurement (TECSOU)

IHO Definition: **TECHNIQUE OF VERTICAL MEASUREMENT.** Survey method used to obtain depth information.

Attribute Type: Enumeration

1) found by echo sounder

IHO Definition: The depth was measured by using an instrument that determines depth of water by measuring the time interval between emission of a sonic or ultrasonic signal and return of its echo from the bottom. (Adapted from IHO Dictionary – S-32).

2) found by side scan sonar

IHO Definition: The depth was computed from a record produced by active sonar in which fixed acoustic beams are directed into the water perpendicularly to the direction of travel to scan the seabed and generate a record of the seabed configuration. (Adapted from IHO Dictionary – S-32).

3) found by multi beam

IHO Definition: The depth was measured by using a wide swath echo sounder that uses multiple beams to measure depths directly below and transverse to the ship's track. (Adapted from IHO Dictionary – S-32).

4) found by diver

IHO Definition: The depth was determined by a person skilled in the practice of diving. (Adapted from IHO Dictionary – S-32).

5) found by lead line

IHO Definition: The depth was measured by using a line, graduated with attached marks and fastened to a sounding lead. (Adapted from IHO Dictionary – S-32).

6) swept by wire-drag

IHO Definition: The given area was determined to be free from navigational dangers to a certain depth by towing a buoyed wire at the desired depth by two launches, or a least depth was identified using the same technique. (Hydrographic Dictionary, Part I Volume I, English)

8) swept by vertical acoustic system

IHO Definition: The given area has been swept using a system comprised of multiple echo sounder transducers attached to booms deployed from the survey vessel. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.207, November 2000).

9) found by electromagnetic sensor

IHO Definition: The depth was determined by using an instrument that compares electromagnetic signals. (Adapted from IHO Dictionary – S-32).

10) photogrammetry

IHO Definition: The science or art of obtaining reliable measurements from photographs. (IHO Dictionary – S-32).

11) satellite imagery

IHO Definition: The depth was determined by using instruments placed aboard an artificial satellite. (Adapted from IHO Dictionary – S-32).

12) found by levelling

IHO Definition: The depth was determined by using levelling techniques to find the elevation of the point relative to a datum. (Adapted from IHO Dictionary – S-32).

13) swept by side scan sonar

IHO Definition: The given area was determined to be free from navigational dangers to a certain depth by towing a side scan sonar. (Adapted from IHO Dictionary – S-32).

15) found by LIDAR

IHO Definition: The depth was measured by using an instrument that measures distance by emitting timed pulses of laser light and measuring the time between emission and reception of the reflected pulses. (Adapted from IHO Dictionary – S-32).

16) synthetic Aperture Radar

IHO Definition: A radar with a synthetic aperture antenna which is composed of a large number of elementary transducing elements. The signals are electronically combined into a resulting signal equivalent to that of a single antenna of a given aperture in a given direction. (IHO Dictionary – S-32).

17) hyperspectral Imagery

IHO Definition: Term used to describe the imagery derived from subdividing the electromagnetic spectrum into very narrow bandwidths. These narrow bandwidths may be combined with or subtracted from each other in various ways to form images useful in precise terrain or target analysis.

18) mechanically swept

IHO Definition: The given area was determined to be free from navigational dangers to a certain depth by towing a line or object below the surface at the desired depth; or least depth(s) and position(s) within an area was identified using the same technique. (Adapted from IHO Dictionary – S-32).

Remarks:

No remarks.

27.241 telecommunication identifier

IHO Definition: **TELECOMMUNICATION IDENTIFIER.** An identifier, such as words, numbers, letters, symbols, or any combination of those used to establish a contact to a particular person, organisation or service.

Attribute Type: Text

Indication:

Format: c...

Example: +61 2 4223 6500; pilsener@beer.com

Remarks:

- The telecommunication identifier should include the international and any applicable regional codes.
- The attribute **telecommunication identifier** should contain no more than 50 characters.

27.242 telecommunication service

IHO Definition: **TELECOMMUNICATION SERVICE.** Classification of methods of communication over a distance by electrical, electronic, or electromagnetic means.

Attribute Type: Enumeration

1) voice

IHO Definition: The transfer or exchange of information by using sounds that are being made by mouth and throat when speaking.

2) facsimile

IHO Definition: A system of transmitting and reproducing graphic matter (as printing or still pictures) by means of signals sent over telephone lines. (Merriam-Webster Dictionary – 2014).

3) **SMS**

IHO Definition: Short Message Service is a form of text messaging communication on phones and mobile phones.

4) **data**

IHO Definition: A representation of facts, concepts or instructions in a formalised manner suitable for communication, interpretation or processing. (IHO Dictionary – S-32).

5) **streamed data**

IHO Definition: Data that is constantly received by and presented to an end-user while being delivered by a provider.

6) **telex**

IHO Definition: A system of communication in which messages are sent over long distances by using a telephone system and are printed by using a special machine (called a teletypewriter). (Merriam-Webster Dictionary – 2014).

7) **telegraph**

IHO Definition: An apparatus, system or process for communication at a distance by electric transmission over wire.

8) **email**

IHO Definition: Messages and other data exchanged between individuals using computers in a network. (Merriam-Webster Dictionary – 2014).

Remarks:

No remarks.

27.243 text (**INFORM, NINFOM**)

IHO Definition: **TEXT**. A non-formatted digital text string.

Attribute Type: Text

Indication:

Remarks:

- This attribute should be used, for example, to hold the information that is shown on paper charts by short cautionary or explanatory notes. Therefore, text populated in **text** must not exceed 300 characters.
- Text may be in English, or in a national language defined by the attribute **language** (see clause 27.164).
- No formatting of text is possible within **text**. If formatted text, or text strings exceeding 300 characters, is required, then the sub-attribute **file reference** must be used (see clause 27.143).

27.244 text offset bearing

IHO Definition: **TEXT OFFSET BEARING**. The angular distance measured from true north that text associated with a feature is positioned from the feature in an end-user system.

Attribute Type: Integer

Unit: Degree (°)

Minimum range: 0

Maximum range: 360

Range closure: Right half-open interval *(minimum ≤ text offset bearing < maximum)*

Example: **246** for a text offset bearing of 246 degrees

Remarks:

- An orientation quoted as 360° must be encoded as 0.
 - The attribute **text offset bearing** only defines the bearing to the anchor point of the text in the end-user system. It does not impact on the rotation of the text itself (that is, text is always displayed horizontally on the screen).

27.245 text offset distance

IHO Definition: TEXT OFFSET DISTANCE. The distance that text associated with a feature is positioned from the feature in an end-user system.

Attribute Type: Integer

Unit: Defined in relation to the desired distance in the Inland ECDIS or ECS display from the associated feature at the optimum display scale of the IENC data in millimetres (mm).

Minimum range: 0

Maximum range: 50

Range closure: Left half-open interval

(*minimum* < **text offset distance** ≤ *maximum*)

Example: 15 for a text offset of 15 mm

Remarks:

None.

27.246 text rotation

IHO Definition: TEXT ROTATION. A statement that expresses if text associated with a feature is to be rotated in the ECDIS display or not.

Attribute Type: Boolean

Indication: A True value is an indication that the text is to be rotated in accordance with a defined parameter.

Remarks:

- The rotation of the text in the Inland ECDIS or ECS is done in accordance with the value populated for the attribute **text offset bearing**.

27.247 text type

IHO Definition: **TEXT TYPE**. The attribute from which a text string is derived.

Attribute Type: Enumeration

name

IHO Definition: See clause 27.188.

feature characteristic

IHO Definition: A distinguishing trait, quality, or property of a feature class. (Adapted from Merriam-Webster Dictionary – 2024).

Remarks:

- For **text type = 1** (name), the text display preference is the name of the feature (see clause 27.188).

- For **text type** = 2 (feature characteristic), the text display preference is the textual feature characteristics for which the corresponding S-401 portrayal rule implements a standardized textual string based on the attribution for the binding feature. If the portrayal rule implements more than one textual string for a feature based on multiple attributes (for example the vertical and horizontal clearances for a bridge pan), the text labels will all be listed, one after the other.(for example the construction of a light characteristic).

27.248 time of day end

IHO Definition: **TIME OF DAY END.** The time corresponding to the end of an active period.

Attribute Type: Time

Indication: The “time of day end” must be encoded using 2 digits for the hour (hh), 2 digits for the minutes (mm) and 2 digits for the seconds (ss). Additional characters are added dependant on the time zone indication (UTC or offset to UTC). This conforms to ISO 8601.

Format: hhmmssZ (**mandatory** for UTC time)
hhmmss+hhmm (**mandatory** for local time with UTC offset)
hhmmss (**mandatory** for local time without offset)

Example: 162000Z for a period ending at 04:20 pm UTC.
162000+0100 for a period ending at 04:20 pm local time, 1 hour ahead of UTC.
162000 for a period ending at 04:20 pm local time, without specified offset to UTC.

Remarks:

- Local time expressed without a specified offset to UTC can be used where the same time of day applies locally, regardless of any local seasonal time adjustments (for example daylight saving (or Summer) time), but local time with UTC offset is preferred.

27.249 time of day start

IHO Definition: **TIME OF DAY START.** The time corresponding to the start of an active period.

Attribute Type: Time

Indication: The “time of day start” must be encoded using 2 digits for the hour (hh), 2 digits for the minutes (mm) and 2 digits for the seconds (ss). Additional characters are added dependant on the time zone indication (UTC or offset to UTC). This conforms to ISO 8601.

Format: hhmmssZ (**mandatory** for UTC time)
hhmmss+hhmm (**mandatory** for local time with UTC offset)
hhmmss (**mandatory** for local time without offset)

Example: 094500Z for a period starting at 09:45 am UTC.
094500+0100 for a period starting at 09:45 am local time, 1 hour ahead of UTC.
094500 for a period starting at 09:45 am local time, without specified offset to UTC.

Remarks:

- Local time expressed without a specified offset to UTC can be used where the same time of day applies locally, regardless of any local seasonal time adjustments (for example daylight saving (or Summer) time), but local time with UTC offset is preferred.

27.250 time relative to tide

IHO Definition: **TIME RELATIVE TO TIDE.** The time difference relative to the reference tide.

Attribute Type: Real

Unit: Hour

Precision: 0.1 hour

Minimum range: -6

Maximum range: 6

Range closure: Closed interval (*minimum ≤ tide relative to tide ≤ maximum*)

Example: 1.5 for 1.5 hours after the referenced tide
-1.5 for 1.5 hours before the referenced tide

Remarks:

- Positive values are time after the referenced tide, negative values are time before the referenced tide.

27.251 time schedule reference (schref)

IHO Definition: The string encodes the file name of an external file.

Attribute Type: Text

Remarks:

- No remarks.

27.252 topmark/daymark shape (TOPSHP)

IHO Definition: **TOPMARK/DAYMARK SHAPE.** The shape a topmark or daymark exhibits.

Attribute Type: Enumeration

1) cone (point up)

IHO Definition: Is where the vertex points up. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.222, November 2000).

2) cone (point down)

IHO Definition: Is where the vertex points down. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.222, November 2000).

3) sphere

IHO Definition: A curved surface all points of which are equidistant from a fixed point within, called the centre. (IHO Dictionary – S-32).

4) 2 spheres

IHO Definition: Two spheres, one above the other. Two black spheres are commonly used as an International Association of Lighthouse Authorities - IALA topmark (isolated danger). (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.223, November 2000).

5) cylinder

IHO Definition: A solid geometrical figure generated by straight lines fixed in direction and describing with one of point a closed curve, especially a circle (in which case the figure is circular cylinder, its ends being parallel circles). (The New Shorter Oxford English Dictionary, 1993, vol 2).

6) board

IHO Definition: Usually of rectangular shape, made from timber or metal and used to provide a contrast with the natural background of a daymark. The actual daymark is often painted on to this board. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.223, November 2000).

7) x-shaped

IHO Definition: Having a shape or a cross-section like the capital letter X. (The New Shorter Oxford English Dictionary, 1993, vol 2).

8) upright cross

IHO Definition: A cross with one vertical member and one horizontal member; that is, similar in shape to the character “+”. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.223, November 2000).

9) cube (point up)

IHO Definition: A cube standing on one of its vertexes. A cube is a solid contained by six equal squares; a regular hexahedron (Adapted from The New Shorter Oxford English Dictionary, 1993, vol 2).

10) 2 cones (point to point)

IHO Definition: 2 cones, one above the other, with their vertices together in the centre. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.223, November 2000).

11) 2 cones (base to base)

IHO Definition: 2 cones, one above the other, with their bases together in the centre and their vertices pointing up and down. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.223, November 2000).

12) rhombus

IHO Definition: A plane figure having four equal sides and equal opposite angles (two acute and two obtuse); an oblique equilateral parallelogram. (The New Shorter Oxford English Dictionary, 1993, vol 2).

13) 2 cones (points upward)

IHO Definition: 2 cones, one above the other, with their vertices pointing up. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.223, November 2000).

14) 2 cones (points downward)

IHO Definition: 2 cones, one above the other, with their vertices pointing down. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.223, November 2000).

15) besom (point up)

IHO Definition: A bundle of rods or twigs. A besom, point up is where the thicker (untied) end of the besom is at the bottom. (Adapted from The New Shorter Oxford English Dictionary, 1993, vol 2).

16) besom (point down)

IHO Definition: A bundle of rods or twigs. A besom, point down is where the thinner (tied) end of the besom is at the bottom. (Adapted from The New Shorter Oxford English Dictionary, 1993, vol 2).

17) flag

IHO Definition: A flag mounted on a short pole. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.223, November 2000).

18) sphere over a rhombus

IHO Definition: A sphere located above a rhombus. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.223, November 2000).

19) square

IHO Definition: A plane figure with four right angles and four equal straight sides (The New Shorter Oxford English Dictionary, 1993, vol 2).

20) rectangle (horizontal)

IHO Definition: A horizontal rectangle is where the two longer opposite sides are standing horizontally. (Adapted from The New Shorter Oxford English Dictionary, 1993, vol 2).

21) rectangle (vertical)

IHO Definition: A vertical rectangle is where the two longer opposite sides are standing vertically. (Adapted from The New Shorter Oxford English Dictionary, 1993, vol 2).

22) trapezium (up)

IHO Definition: A quadrilateral having one pair of opposite sides parallel, and which stands on its longer parallel side. (Adapted from The New Shorter Oxford English Dictionary, 1993, vol 2).

23) trapezium (down)

IHO Definition: A quadrilateral having one pair of opposite sides parallel, and which stands on its shorter parallel side. (Adapted from The New Shorter Oxford English Dictionary, 1993, vol 2).

24) triangle (point up)

IHO Definition: A figure having three angles and three sides, and which has a vertex at the top. (Adapted from New Shorter Oxford English Dictionary, 1993, vol 2).

25) triangle (point down)

IHO Definition: A figure having three angles and three sides, and which has a side at the top. (Adapted from New Shorter Oxford English Dictionary, 1993, vol 2).

26) circle

IHO Definition: A perfectly round plane figure whose circumference is everywhere equidistant from its centre. (The New Shorter Oxford English Dictionary, 1993, vol 1).

27) two upright crosses (one over the other)

IHO Definition: Two upright crosses, generally vertically disposed one above the other. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.224, November 2000).

28) T-shape

IHO Definition: Having a shape like the capital letter T. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.224, November 2000).

29) triangle pointing up over a circle

IHO Definition: A triangle, vertex uppermost, located above a circle. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.224, November 2000).

30) upright cross over a circle

IHO Definition: An upright cross located above a circle. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.224, November 2000).

31) rhombus over a circle

IHO Definition: A rhombus located above a circle. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.224, November 2000).

32) circle over a triangle pointing up

IHO Definition: A circle located over a triangle, vertex uppermost. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.224, November 2000).

33) other shape (see shape information)

IHO Definition: An uncommon and/or non-standardized shape as textually described using an associated attribute.

34) tubular

IHO Definition: Having the form of or consisting of a tube.(Merriam-Webster's Collegiate Dictionary).

Remarks:

- **Cone:** A solid figure generated by straight lines drawn from a fixed point (the vertex) to a circle in a plane not containing the vertex. (The New Shorter Oxford English Dictionary, 1993, vol 2).
Cones are commonly used as International Association of Lighthouse Authorities - IALA topmarks (lateral). (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.222, November 2000).
- Spheres are commonly used as International Association of Lighthouse Authorities - IALA topmarks (safe water). (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.223, November 2000).
- Cylinders are commonly used as International Association of Lighthouse Authorities - IALA topmarks (lateral). (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.223, November 2000).
- An x-shape as an International Association of Lighthouse Authorities – IALA topmark should be 3 dimensional in shape. It is made of at least three crossed bars. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.223, November 2000).

- A rectangle is a plane figure with four right angles and four straight sides, opposite sides being parallel and equal in length. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.223, November 2000).

27.253 traffic flow (TRAFIC)

IHO Definition: **TRAFFIC FLOW.** Direction of vessels passing a reference point.

Attribute Type: Enumeration

1) inbound

IHO Definition: Traffic flow in a general direction toward a port or similar destination. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.225, November 2000).

2) outbound

IHO Definition: Traffic flow in a general direction away from a port or similar point of origin. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.225, November 2000).

3) one-way

IHO Definition: Traffic flow in one general direction only. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.225, November 2000).

4) two-way

IHO Definition: Traffic flow in two generally opposite directions. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.225, November 2000).

Remarks:

No remarks.

27.254 transshipping goods (trshgd)

IHO Definition: List of goods, which can be transshipped.

1) Containers

IHO Definition: Boxes for cargo transport with standardized dimensions.

2) Bulk Goods

IHO Definition: Unpacked bulk cargo in the same or a similar kind of nature (homogeneous).

3) Oil

IHO Definition: A thick, slippery liquid that will not dissolve in water, usually petroleum based in the context of storage tanks.

4) Fuel

IHO Definition: Liquid fuel, e.g. gasoline, diesel.

5) Chemicals

IHO Definition: Any substance obtained by or used in a chemical process.

6) Liquid Goods

IHO Definition: Fluids whose shape is usually determined by the container it fills.

7) Explosive Goods

IHO Definition: Goods that undergoes decomposition or combustion with great rapidity, evolving much heat and producing a large volume of gas.

8) Fish

IHO Definition: Vertebrate cold blooded animal with gills, living in water.

9) Cars

IHO Definition: Wheeled vehicles.

10) General Cargo

IHO Definition: General cargo.

11) Large-Volume And Heavy Goods (Exceptional Transports)

Goods that are exceptional transports on the road due to their large volume and/or their mass according to national legislation.

Remarks:

No remarks.

27.255 type of AtoN (typatn)

IHO Definition: The type of AtoN being referenced.

1) Aid to Navigation

IHO Definition: A visual, acoustical, or radio device, external to a ship, designed to assist in determining a safe course or a vessel's position, or to warn of dangers and/or obstructions. Aids to navigation usually include buoys, beacons, fog signals, lights, radio beacons, leading marks, radio position fixing systems and GNSS which are chart-related and assist safe navigation.

2) Physical AIS Aid to Navigation

IHO Definition: An Automatic Identification System (AIS) message 21 transmitted from a physical Aid to Navigation, or transmitted from an AIS station for an Aid to Navigation which physically exists.

3) Virtual AIS Aid to Navigation

IHO Definition: An Automatic Identification System (AIS) message 21 transmitted from an AIS station to simulate on navigation systems an Aid to Navigation which does not physically exist.

Remarks:

No remarks.

27.256 type of ship (shptyp)

IHO Definition: Type of ship.

1) General Cargo Vessel

IHO Definition: A vessel which is designed for carrying general cargo, e.g. boxes, sacks.

2) Container Vessel

IHO Definition: A vessel which is designed for carrying containers.

3) Tanker

IHO Definition: A vessel which is designed for carrying liquid goods, for example oil or water.

4) Sailing Vessel

IHO Definition: A vessel that is powered by the wind; often having several masts.

5) Fishing Vessel

IHO Definition: A vessel that is used and equipped for the fishing of living aquatic resources.

6) Special Purpose Vessel

IHO Definition: A vessel that fulfills special purposes; for example hovercrafts, pilot **boats**.

7) Man of War

IHO Definition: Armed naval vessel.

8) Submarine

IHO Definition: A vessel that is capable of operating for an extended period of time underwater.

9) High Speed Craft

IHO Definition: A motorized vessel capable of reaching speeds over 40km/h with respect to water.

10) Bulk Carrier

IHO Definition: A vessel which is designed for carrying bulk goods, e.g. coal, ore or grain.

11) Seaplane

IHO Definition: Airplane designed to take off from and alight on water.

12) Tugboat

IHO Definition: A powerful small boat designed to pull or push larger ships or powerless barges.

13) Passenger Vessel

IHO Definition: A day trip or cabin vessel constructed and equipped to carry more than 12 passengers.

14) Ferry

IHO Definition: A vessel for transporting passengers, vehicles, and/or goods across a stretch of water, especially as a regular service.

15) Boat

IHO Definition: A small vessel.

Remarks:

- No remarks.

27.257 UN location code (unlocod)

IHO Definition: Used to encode the UN Location Code

(<http://www.unece.org/cefact/locode/service/location.html>) or - in Europe - the Inland Ship Reporting Standard (ISRS) Code.

Attribute Type: text

Remarks:

The ISRS Code exists of:

- UN country code (2 digits),
 - UN Location code (3 digits, "XXX" if not available),
 - Fairway section number (5 numerical digits, to be determined by the national authority; a side branch should have an own section number, when there are special restrictions, e.g. bridges),
 - terminal code or passage point code (5 alphanumerical digits, "00000" if not available),
 - fairway section hectometre (5 numerical digits, hectometre at the centre of the area, "00000" if not available).
- The ISRS code should only be encoded for new features if it is intended to publish Application Specific Messages (ASM) via Inland AIS for those features.

27.258 underlying layer

IHO Definition: UNDERLYING LAYER. The position of the seabed type within the layers of the seabed.

Attribute Type: Integer

Indication: The value indicates the level of a material in a layered seabed, with the value 0 indicating the topmost level.

Minimum range: 0

Maximum range: 5

Range closure: Left half-open interval (*minimum < underlying layer ≤ maximum*)

Example: 1 where the seabed type is the layer below the top of the seabed surface.

Remarks:

No remarks.

27.259 use of ship (useshp)

IHO Definition: Indication of the way the ship is used.

1) Liner Trade

IHO Definition: Ship is used to carry goods on a scheduled service.

2) Occasional Professional Shipping

IHO Definition: Ship is occasional used for professional shipping.

3) Leisure

IHO Definition: Ship is used for leisure activities.

Remarks:

No remarks.

27.260 value at other locally relevant water level (othwat)

IHO Definition: Value at waterway gauge in case of a specific water level, which is locally of importance or of interest for navigation.

Attribute Type: Real

Unit: metre (m)

Precision: 0·01 m

Minimum range: 0

Example: 1·5 for 1·5 m

Remarks:

No remarks.

27.261 value at relevant high water level (higwat)

IHO Definition: Value at waterway gauge in case of exact high water level (according to official regulations at the specific section of waterway).

Attribute Type: Real

Unit: metre (m)

Precision: 0·01 m

Minimum range: 0

Example: 1·5 for 1·5 m

Remarks:

No remarks.

27.262 value at relevant low water level (lowwat)

IHO Definition: Value at waterway gauge in case of exact low water level (according to official regulations at the specific section of waterway).

Attribute Type: Real

Unit: metre (m)

Precision: 0·01 m

Minimum range: 0

Example: 1·5 for 1·5 m

Remarks:

No remarks.

27.263 value at relevant mean water level (meawat)

IHO Definition: Value at waterway gauge in case of exact mean water level (according to official regulations at the specific section of waterway).

Attribute Type: Real

Unit: metre (m)

Precision: 0·01 m

Minimum range: 0

Example: 1·5 for 1·5 m

Remarks:

No remarks.

27.264 value of annual change in magnetic variation (VALACM)

IHO Definition: **VALUE OF ANNUAL CHANGE IN MAGNETIC VARIATION.** The annual change in magnetic variation values. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.226, November 2000).

Attribute Type: Real

Unit: minute ('), negative west

Precision: 0.1'

Minimum range: -1200

Maximum range: 1200

Range closure: Closed interval (*minimum ≤ value of annual change in magnetic variation ≤ maximum*)

Example: **-7.1** for an annual change of 7·1' in a westerly direction

Remarks:

- A positive value; that is, unsigned, indicates a change in an easterly direction and a negative value indicates a change in a westerly direction.

27.265 value of depth contour (VALDCO)

IHO Definition: **VALUE OF DEPTH CONTOUR.** The depth of a sea bottom contour. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.227, November 2000).

Attribute Type: Real

Unit: metre (m)

Precision: 0·1m

Minimum range: -30

Maximum range: 12500

Range closure: Open interval (*minimum < value of depth contour < maximum*)

Example: **50** for a depth contour of 50 metres

Remarks:

- Drying contours are indicated by a negative value.

27.266 value of magnetic variation (VALMAG)

IHO Definition: **VALUE OF MAGNETIC VARIATION.** The angle between the magnetic and geographical meridians at any place, expressed in degrees east or west to indicate the direction of magnetic north from true north. (IHO Dictionary – S-32).

Attribute Type: Real

Unit: degree (°), negative west

Precision: 0.01°

Minimum range: -180

Maximum range: 180

Range closure: Left half-open interval (*minimum < value of magnetic variation ≤ maximum*)

Example: **2.3** for a magnetic north oriented at 2.3 degrees (2°18') east from the geographic (true) north
-1.5 for a magnetic north oriented at 2.3 degrees (1°30') west from the geographic (true) north

Remarks:

- A positive value; that is, unsigned, indicates a change in an easterly direction and a negative value indicates a change in a westerly direction.

27.267 value of maximum range (VALMXR)

IHO Definition: **VALUE OF MAXIMUM RANGE.** The extreme distance at which a feature can be seen or a signal detected. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.230, November 2000).

Attribute Type: Real

Unit: Nautical mile (M)

Precision: 0·1M

Minimum range: 0

Range closure: Left half-open ray (*minimum < value of maximum range*)

Example: 17 for maximum range of 17 nautical miles

Remarks:

- This attribute does not apply to lights, where the attribute “value of nominal range” should be used.

27.268 value of nominal range (VALNMR)

IHO Definition: **VALUE OF NOMINAL RANGE.** The luminous range of a light in a homogenous atmosphere in which the meteorological visibility is 10 sea miles. (IHO Dictionary – S-32).

Attribute Type: Real

Unit: Nautical mile (M)

Precision: 0·1M

Minimum range: 0

Maximum range: 30

Range closure: Left half-open interval (*minimum < value of nominal range ≤ maximum*)

Example: 14 for a nominal range of 14 nautical miles

Remarks:

None.

27.269 value of sounding (VALSOU)

IHO Definition: **VALUE OF SOUNDING.** The value of the measurement of a sounding relative to the chart datum. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.232, November 2000).

Attribute Type: Real

Unit: Defined as an attribute in the IENC dataset metadata: metre (m)

Precision: 0·1m

Minimum range: -30

Maximum range: 12500

Range closure: Open interval (*minimum < value of sounding < maximum*)

Examples: 18·2 for a sounding of 18·2 metres

-2·4 for a drying height of 2·4 metres

Remarks:

- A drying height is indicated by a negative value.

27.270 vertical clearance unlimited

IHO Definition: **VERTICAL CLEARANCE UNLIMITED.** A statement that expresses if the vertical clearance for a feature in the open position, such as a bridge span, is unlimited.

Attribute Type: Boolean

Indication: A True value is an indication that the vertical clearance for a feature in the open position is unlimited.

Remarks:

No remarks.

27.271 vertical clearance value (VERCLR) (VERCCL, VERCOP, VERCSA)

IHO Definition: VERTICAL CLEARANCE VALUE. The vertical clearance measured from the horizontal plane towards the feature overhead. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.234, November 2000).

Attribute Type: Real

Unit: Defined as an attribute in the IENC Dataset Discovery Metadata: metre (m)

Precision: 0·1m

Minimum range: 0

Range closure: Left half-open ray $(\text{minimum} < \text{vertical clearance value})$

Example: 7.6 for a vertical clearance of 7.6 metres

Remarks:

No remarks.

27.272 vertical datum (VERDAT)

IHO Definition: **VERTICAL DATUM**. The reference level used for expressing the vertical measurements of points on the earth's surface. Also called datum level, reference plane, levelling datum, datum for sounding reduction, datum for heights. (Adapted from IHO Dictionary, S-32).

Attribute Type: Enumeration

1) mean low water springs

IHO Definition: The average height of the low waters of spring tides. This level is used as a tidal datum in some areas. (IHO Dictionary – S-32).

2) mean lower low water springs

IHO Definition: The average height of lower low water springs at a place. (IHO Dictionary – S-32).

3) mean sea level

IHO Definition: The average height of the surface of the sea at a tide station for all stages of the tide over a 19-year period, usually determined from hourly height readings measured from a fixed predetermined reference level. (IHO Dictionary – S-32).

4) lowest low water

IHO Definition: An arbitrary level conforming to the lowest tide observed at a place, or somewhat lower. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.239, November 2000).

5) mean low water

IHO Definition: The average height of all low waters at a place over a 19-year period. (IHO Dictionary – S-32).

6) lowest low water springs

IHO Definition: An arbitrary level conforming to the lowest water level observed at a place at spring tides during a period of time shorter than 19 years. (Australian Hydrographic Office).

7) approximate mean low water springs

IHO Definition: An arbitrary level, usually within 0.3m from that of mean low water springs (MLWS). (Australian Hydrographic Office).

8) indian spring low water

IHO Definition: An arbitrary tidal datum approximating the level of the mean of the lower low water at spring tides. It was first used in waters surrounding India. (IHO Dictionary – S-32).

A tidal datum approximating the lowest water level observed at a place, originated by G.H. Darwin for the tides of India at a level below MSL being equal to the sum of amplitudes of the harmonic constituents M2, S2, K1 and O1; usually below that of the lower low water at spring tides. Also called Indian tide plane. (Australian Hydrographic Office).

9) **low water springs**

IHO Definition: An arbitrary level, approximating that of mean low water springs (MLWS). (Australian Hydrographic Office).

10) **approximate lowest astronomical tide**

IHO Definition: An arbitrary level, usually within 0.3m from that of lowest astronomical tide (LAT). (Australian Hydrographic Office).

11) **nearly lowest low water**

IHO Definition: An arbitrary level approximating the lowest water level observed at a place, usually equivalent to the Indian spring low water (ISLW). (Australian Hydrographic Office).

12) **mean lower low water**

IHO Definition: The average height of the lower low waters at a place over a 19-year period. (IHO Dictionary – S-32).

13) **low water**

IHO Definition: The lowest level reached at a place by the water surface in one oscillation. (IHO Dictionary – S-32).

14) **approximate mean low water**

IHO Definition: An arbitrary level, usually within 0.3m from that of mean low water (MLW). (Australian Hydrographic Office).

15) **approximate mean lower low water**

IHO Definition: An arbitrary level, usually within 0.3m from that of mean lower low water (MLLW). (Australian Hydrographic Office).

16) **mean high water**

IHO Definition: The average height of all high waters at a place over a 19-year period. (IHO Dictionary, S-32).

17) **mean high water springs**

IHO Definition: The average height of the high waters of spring tides. (IHO Dictionary, S-32).

18) **high water**

IHO Definition: The highest level reached at a place by the water surface in one oscillation. (IHO Dictionary, S-32).

19) **approximate mean sea level**

IHO Definition: An arbitrary level, usually within 0.3m from that of mean sea level (MSL). (Australian Hydrographic Office).

20) **high water springs**

IHO Definition: An arbitrary level, approximating that of mean high water springs (MHWS). (Australian Hydrographic Office).

21) **mean higher high water**

IHO Definition: The average height of higher high waters at a place over a 19-year period. (IHO Dictionary, S-32).

22) **equinoctial spring low water**

IHO Definition: The level of low water springs near the time of an equinox. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.240, November 2000).

23) lowest astronomical tide

IHO Definition: The lowest tide level which can be predicted to occur under average meteorological conditions and under any combination of astronomical conditions. (IHO Dictionary – S-32).

24) local datum

IHO Definition: An arbitrary datum defined by a local harbour authority, from which levels and tidal heights are measured by this authority. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.240, November 2000).

25) international Great Lakes Datum 1985

IHO Definition: A vertical reference system with its zero based on the mean water level at Rimouski/Pointe-au-Père, Quebec, over the period 1970 to 1988. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.240, November 2000).

26) mean water level

IHO Definition: The average of all hourly water levels over the available period of record. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.240, November 2000).

27) lower low water large tide

IHO Definition: The average of the lowest low waters, one from each of 19 years of observations. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.240, November 2000).

28) higher high water large tide

IHO Definition: The average of the highest high waters, one from each of 19 years of observations. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.240, November 2000).

29) nearly highest high water

IHO Definition: An arbitrary level approximating the highest water level observed at a place, usually equivalent to the high water springs. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.240, November 2000).

30) highest astronomical tide

IHO Definition: The highest tidal level which can be predicted to occur under average meteorological conditions and under any combination of astronomical conditions. (IHO Dictionary, S-32).

31) local low water reference level

IHO Definition: Low water reference level of the local area.

32) local high water reference level

IHO Definition: High water reference level of the local area.

33) local mean water reference level

IHO Definition: Mean water reference level of the local area.

34) equivalent height of water (German GIW)

IHO Definition: A low water level which is the result of a defined low water discharge - called "equivalent discharge".

35) highest shipping height of water (German HSW)

IHO Definition: Upper limit of water levels where navigation is allowed.

36) reference low water level according to Danube Commission

IHO Definition: The water level at a discharge, which is exceeded 94 % of the year within a period of 30 years.

37) highest shipping height of water according to Danube Commission

IHO Definition: The water level at a discharge, which is exceeded 1% of the year within a period of 30 years.

38) Dutch river low water reference level (OLR)

IHO Definition: The water level at a discharge, which is exceeded 95% of the year within a period of 20 years.

39) Russian project water level

IHO Definition: Conditional low water level with established probability.

40) Russian normal backwater level

IHO Definition: Highest water level derived from the upper backwater stream in watercourse or reservoir under the normal operational conditions.

41) Ohio river datum

IHO Definition: The Ohio River datum.

43) Dutch high water reference level

IHO Definition: Dutch High Water Reference Level.

44) baltic sea chart datum 2000

IHO Definition: The datum refers to each Baltic country's realization of the European Vertical Reference System (EVRS) with land-uplift epoch 2000, which is connected to the Normaal Amsterdams Peil (NAP). (Baltic Sea Hydrographic Commission).

45) Dutch estuary low water reference level (OLW)

IHO Definition: Dutch Estuary Low Water Reference Level (OLW)

Remarks:

- This attribute is used to specify the datum to which both heights (vertical datum) and soundings (soundings datum) are referred.
 - When the vertical datum is unknown, such as water areas above locks, the value “local datum” should be used, and further details may be encoded using the complex attribute **information** (see clause 2.4.6).
 - The ± 0.3m approximation quoted in the “approximate” levels is arbitrary and follows the British example of their definition for “approximate LAT”.

27.273 vertical length (VERLEN)

IHO Definition: **VERTICAL LENGTH.** The total vertical length of a feature. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.242, November 2000).

Attribute Type: Real

Unit: Defined as an attribute in the IENC Dataset Discovery Metadata: metre (m)

Precision: 0·1m

Minimum range: 0

Maximum range: 900

Range closure: Left half-open interval ($\text{minimum} < \text{vertical length} \leq \text{maximum}$)

Minimum value: 0

Example: **24.5** for a vertical length of 24.5 metres

Remarks:

- Remarks:

 - For floating features: The vertical distance from the surface of water to the highest point of that feature.
 - For fixed features: The vertical distance from seabed or ground to the highest point of that feature.
 - For features on top of other features: the vertical distance from the lowest to the highest point of that feature.
 - Vertical length measurements do not require a datum.

27.274 vertical river datum reference level value (vcrval)

IHO Definition: Local value of the vertical clearance reference level.

Attribute Type: Real

Unit: metre (m)

Precision: 0·1m

Minimum range: 0

Maximum range: 3000

Minimum value: 0

Example: 4.5 for a reference level value of 4.5 metres

Remarks:

No remarks.

27.275 vessel class

IHO Definition: **VESSEL CLASS.** The classification of a vessel, normally as defined by length or gross tonnage.

Indication: The string encodes the classification of a vessel, normally by length or gross tonnage.

Attribute Type: Text

Remarks:

- The attribute **vessel class** should contain no more than 50 characters.

27.276 visitors mooring (CATSCF)

IHO Definition: **VISITORS MOORING.** A mooring set aside for the use of visiting vessels. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

Attribute Type: Boolean

Indication: A True value is an indication that a mooring is designated as a visitors mooring.

Remarks:

No remarks.

27.277 visual prominence (CONVIS)

IHO Definition: **VISUAL PROMINENCE.** The extent to which a feature, either natural or artificial, is visible from seaward. (Adapted from IHO Dictionary – S-32).

Attribute Type: Enumeration

1) visually conspicuous

IHO Definition: Term applied to an object either natural or artificial which is distinctly and notably visible from seaward. (IHO Dictionary – S-32).

2) not visually conspicuous

IHO Definition: An object that may be visible from seaward, but cannot be used as a fixing mark and is not conspicuous. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.120, November 2000).

3) prominent

IHO Definition: Objects which are easily identifiable, but do not justify being classed as conspicuous. (IHO Dictionary – S-32).

Remarks:
No remarks.

27.278 water displacement unit (lg_wdu)

IHO Definition: Units of measure for water displacement.

1) Other

IHO Definition: Being the one or ones distinct from that or those first mentioned or implied.

2) Cubic Metres

IHO Definition: A unit of volume equal to a cube one metre long on each side.

3) Tonnes

IHO Definition: Commonly referred to as the metric ton in Canada, the United Kingdom and the United States, is a non-SI metric unit of mass equal to 1,000 kilograms or one megagram (symbol: Mg). It is equivalent to approximately 2,204.6 pounds, 1.102 short tons (US) or 0.984 long tons (UK). Although not part of the SI, the tonne is accepted for use with SI units and prefixes by the International Committee for Weights and Measures.

Remarks:

- this attribute provides the unit for the value encoded in the attribute **maximal permitted water displacement (lg_wdp)**, see 27.175.

27.279 water level effect (WATLEV)

IHO Definition: **WATER LEVEL EFFECT.** The effect of the surrounding water on an object. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.243 (Remarks), November 2000).

Attribute Type: Enumeration

1) partly submerged at high water

IHO Definition: Partially covered and partially dry at high water. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.243, November 2000).

2) always dry

IHO Definition: Not covered at high water under average meteorological conditions. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.243, November 2000).

3) always under water/submerged

IHO Definition: Remains covered by water at all times under average meteorological conditions. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.243, November 2000).

4) covers and uncovers

IHO Definition: Expression intended to indicate an area of a reef or other projection from the bottom of a body of water which periodically extends above and is submerged below the surface. Also referred to as dries or uncovers. (IHO Dictionary – S-32).

5) awash

IHO Definition: Flush with, or washed by the waves at low water under average meteorological conditions. (Adapted from IHO Dictionary – S-32).

6) subject to inundation or flooding

28 Meta Feature and Spatial Attribute and Enumerate Descriptions

28.1 category of temporal variation

IHO Definition: **CATEGORY OF TEMPORAL VARIATION.** An assessment of the likelihood of change over time.

Attribute Type: Enumeration

1) **extreme event**

IHO Definition: Indication of the possible impact of a significant event (for example hurricane, earthquake, volcanic eruption, landslide, etc), which is considered likely to have changed the seafloor or landscape significantly.

2) **likely to change and significant shoaling expected**

IHO Definition: Continuous or frequent change (for example river siltation, sand waves, seasonal storms, icebergs, etc) that is likely to result in new significant shoaling.

3) **likely to change but significant shoaling not expected**

IHO Definition: Continuous or frequent change (for example sand wave shift, seasonal storms, icebergs, etc) that is not likely to result in new significant shoaling.

4) **likely to change**

IHO Definition: Continuous or frequent change to non-bathymetric features (for example river siltation, glacier creep/recession, sand dunes, buoys, marine farms, etc).

5) **unlikely to change**

IHO Definition: Significant change to the seafloor is not expected.

6) **unassessed**

IHO Definition: Not having been assessed.

Remarks:

No remarks.

28.2 data assessment

IHO Definition: **DATA ASSESSMENT.** The categorization of the assessment level of bathymetric data for an area.

Attribute Type: Enumeration

1) **assessed**

IHO Definition: The quality of the bathymetric data has been assessed.

2) **assessed (Oceanic)**

IHO Definition: The quality of oceanic bathymetric data (depths deeper than 200 metres) has been assessed, however details are not required.

3) **unassessed**

IHO Definition: Not having been assessed.

Remarks:

No remarks.

28.3 drawing index

IHO Definition: **DRAWING INDEX.** A numeric value used to indicate that datasets are intended to form a seamless presentation.

Attribute Type: Integer

Indication: Datasets that share a common value are intended to form a seamless presentation.

Unit: None

Minimum range: 1

Range closure: Left closed ray (*minimum ≤ drawing index*)

Example: 1 for a datasets intended to be viewed seamlessly with other datasets having drawing index value set to 1.

Remarks:

- The attribute **drawing index** is required where the datasets intended to form a seamless presentation do not share a common minimum display scale. Also required if the dataset may need to form a seamless presentation with one or more S-57 datasets, in which case the value should correspond to the usage band of the adjoining or overlapping S-57 dataset(s).

28.4 full seafloor coverage achieved

IHO Definition: **FULL SEAFLOOR COVERAGE ACHIEVED.** Expression stating if full seafloor coverage has been achieved in the area covered by hydrographic surveys.

Attribute Type: Boolean

Indication: A True value is an indication that full seafloor coverage for an area covered by hydrographic survey(s) has been achieved.

Remarks:

- **full seafloor coverage achieved** applies to both the spatial completeness of feature detection and to the spatial completeness of the measurement of the regular seafloor. The former is further specified by the complex attribute **features detected**, the latter by the attributes **depth range maximum value** and **depth range minimum value**.

28.5 horizontal distance uncertainty (HORACC)

IHO Definition: **HORIZONTAL DISTANCE UNCERTAINTY.** The best estimate of the horizontal accuracy of horizontal clearances and distances. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.136, November 2000).

Attribute Type: Real

Unit: Defined as an attribute in the IENC Dataset Discovery Metadata: metre (m)

Precision: 0·1m

Minimum range: 0

Range closure: Left closed ray (*minimum ≤ horizontal distance uncertainty*)

Example: 0.5 for an error of 0.5 metres.

Remarks:

- The expected input is the radius of the two-dimensional error.
- The error is assumed to be positive and negative. The plus/minus character must not be encoded.

28.6 least depth of detected features measured

IHO Definition: LEAST DEPTH OF DETECTED FEATURES MEASURED. Expression stating if the least depth of detected features in an area was measured.

Attribute Type: Boolean

Indication: A True value is an indication that the characteristics of a hydrographic survey are such that the least depth of significant seafloor features can be determined.

Remarks:

- A feature in this context is any object, whether manmade or not, projecting above the seafloor, which may be a danger for surface navigation (reference: IHO publication S-44).
 - **least depth of detected features measured** does not describe the least depth of features that were actually detected during a hydrographic survey, but the ability of the survey to detect the least depth of features with a maximum uncertainty as defined in IHO publication S-44.

28.7 line spacing maximum

IHO Definition: **LINE SPACING MAXIMUM.** The maximum distance between hydrographic survey lines.

Attribute Type: Integer

Unit: metre

Minimum range: 0

Range closure: Left half-open ray $(\text{minimum} < \text{line spacing maximum})$

Example: 250 for a maximum distance between sounding lines of 250 metres.

Remarks:

No remarks.

28.8 line spacing minimum

IHO Definition: **LINE SPACING MINIMUM.** The minimum distance between hydrographic survey lines.

Attribute Type: Integer

Unit: metre

Minimum range: 0

Range closure: Left half-open ray $(\text{minimum} < \text{line spacing minimum})$

Example: **50** for a minimum distance between sounding lines of 50 metres.

Remarks:

No remarks.

28.9 maximum display scale (CSCALE)

IHO Definition: MAXIMUM DISPLAY SCALE. The value considered by the Data Producer to be the maximum (largest) scale at which the data is to be displayed before it can be considered to be “grossly overscaled”.

Attribute Type: Integer

Indication: The modulus of the scale is indicated, that is 1:22 000 is encoded as 22000.

Unit: none

Minimum range: 1

Maximum range: 10000000

Range closure: Closed interval (*minimum ≤ maximum display scale ≤ maximum*)

Example: 12000 for a maximum display scale of scale of 1:12000

Remarks:

- **Maximum display scale** provides a reference for the user selected viewing scale in the Inland ECDIS or ECS at which the overscale warning will be displayed if there is no larger optimum display scale IENC dataset available.
- This attribute is only used in conjunction with the Meta feature **Data Coverage** which is used to define polygons of equal largest intended viewing scale. See clause 3.5.1-, Table 3-2, for the list of mandatory **maximum display scale** values.

28.10 measurement distance maximum (SDISMX)

IHO Definition: **MEASUREMENT DISTANCE MAXIMUM**. The maximum spacing of the principal measurement lines of a hydrographic survey.

Attribute Type: Integer

Unit: metre

Precision: 1m

Minimum range: 0

Range closure: Left half-open ray (*minimum < measurement distance maximum*)

Example: 30 for a maximum distance between sounding along a sounding line of 30 metres.

Remarks:

- Note that, in spite of the representation of a depth measurement with a single discrete point position, it actually represents an area with a certain footprint on the seafloor.

28.11 measurement distance minimum (SDISMN)

IHO Definition: **MEASUREMENT DISTANCE MINIMUM**. The minimum spacing of the principal measurement lines of a hydrographic survey.

Attribute Type: Integer

Unit: metre

Precision: 1m

Minimum range: 0

Range closure: Left half-open ray (*minimum < measurement distance minimum*)

Example: 5.75 for a minimum distance between sounding along a sounding line of 5.75 metres.

Remarks:

- Note that, in spite of the representation of a depth measurement with a single discrete point position, it actually represents an area with a certain footprint on the seafloor.

28.12 minimum display scale

IHO Definition: **MINIMUM DISPLAY SCALE**. The smallest intended viewing scale for the data.

Attribute Type: Integer

Indication: The modulus of the scale is indicated, that is 1:700 000 is encoded as 700000.

Unit: none

Minimum range: 2000

Maximum range: 10000000

Range closure: Closed interval (*minimum ≤ minimum display scale ≤ maximum*)

Example: 700000 for a minimum display scale of scale of 1:700000

Remarks:

- **Minimum display scale** is intended to be used in a series of IENC cells covering a geographic area to determine the dataset loading strategy as the user selected viewing scale becomes larger.
- This attribute is only used in conjunction with the Meta feature **Data Coverage** which is used to define polygons of equal smallest intended viewing scale. **minimum display scale** should therefore not be confused with the attribute **scale minimum**. See clause 3.5.1, Table 3-2, for the list of mandatory **minimum display scale** values.

28.13 optimum display scale (CSCALE)

IHO Definition: **OPTIMUM DISPLAY SCALE**. The largest intended viewing scale for the data.

Attribute Type: Integer

Indication: The modulus of the scale is indicated, that is 1:22 000 is encoded as 22000.

Unit: none

Minimum range: 1000

Maximum range: 10000000

Range closure: Closed interval (*minimum ≤ optimum display scale ≤ maximum*)

Example: 12000 for an optimum display scale of scale of 1:12000

Remarks:

optimum display scale provides a reference for the user selected viewing scale in the ECDIS at which the overscale indication will be displayed if there is no larger optimum display scale ENC dataset available, as well as the ECDIS viewing scale when the cell is loaded.

This attribute is only used in conjunction with the Meta feature **Data Coverage** which is used to define polygons of equal largest intended viewing scale. See clause 3.5.1, Table 3-2, for the list of mandatory **optimum display scale** values.

28.14 orientation uncertainty

IHO Definition: **ORIENTATION UNCERTAINTY**. The best estimate of the accuracy of a bearing.

Attribute Type: Real

Unit: Degree (°)

Precision: 0.001°

Minimum range: 0

Maximum range: 360

Range closure: Right half-open interval (*minimum ≤ orientation uncertainty < maximum*)

Example: 0.005 for an error of 0.005 degrees

Remarks:

No remarks.

28.15 quality of horizontal measurement (QUAPOS)

IHO Definition: **QUALITY OF HORIZONTAL MEASUREMENT.** The degree of reliability attributed to a position.

Attribute Type: Enumeration

4) **approximate**

IHO Definition: A position that is considered to be less than third-order accuracy, but is generally considered to be within 30.5 metres of its correct geographic location. Also may apply to a feature whose position does not remain fixed. (Adapted from IHO Dictionary – S-32, and IHO Specifications, S-4 – B-424.1).

5) **position doubtful**

IHO Definition: Of uncertain position. The expression is used principally on charts to indicate that a wreck, shoal, etc., has been reported in various positions and not definitely determined in any.

Remarks:

No remarks

28.16 quality of vertical measurement (QUASOU)

IHO Definition: **QUALITY OF VERTICAL MEASUREMENT.** The reliability of the value of a sounding.

Attribute Type: Enumeration

1) **depth known**

IHO Definition: The depth from the chart datum to the seabed (or to the top of a drying feature) is known. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

2) **depth or least depth unknown**

IHO Definition: The depth from chart datum to the seabed, or the shoalest depth of the feature is unknown. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.169, November 2000, as amended).

3) **doubtful sounding**

IHO Definition: A depth that may be less than indicated. (Adapted from IHO Dictionary – S-32).

4) **unreliable sounding**

IHO Definition: A depth that is considered to be an unreliable value. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.169, November 2000).

6) **least depth known**

IHO Definition: The shoalest depth over a feature is of known value. (Adapted from IHO Dictionary – S-32).

7) **least depth unknown, safe clearance at value shown**

IHO Definition: The least depth over a feature is unknown, but there is considered to be safe clearance at this depth. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.169, November 2000).

8) **value reported (not surveyed)**

IHO Definition: Depth value obtained from a report, but not fully surveyed. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.169, November 2000).

9) **value reported (not confirmed)**

IHO Definition: Depth value obtained from a report, which it has not been possible to confirm. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.169, November 2000).

10) **maintained depth**

IHO Definition: The depth at which a channel is kept by human influence, usually by dredging. (IHO Dictionary – S-32).

11) **not regularly maintained**

IHO Definition: Depths may be altered by human influence, but will not be routinely maintained. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.169, November 2000).

Remarks:

- The attribute **quality of vertical measurement** indicates the reliability of the value of sounding.

28.17 scale value maximum (SCVAL1)

IHO Definition: **SCALE VALUE MAXIMUM.** The largest scale for the range of survey scale. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.182, November 2000).

Attribute Type: Integer

Indication: The modulus of the scale is indicated, that is 1:25 000 is encoded as 25000.

Unit: none

Minimum range: 0

Range closure: Left half-open ray $(\text{minimum} < \text{scale value} \leq \text{maximum})$

Example: **25000** for a scale of 1:25000

Remarks:

28.18 scale value minimum (SCVAL2)

IHO Definition: **SCALE VALUE MINIMUM.** The smallest scale for the range of survey scale. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.183, November 2000).

Attribute Type: Integer

Indication: The modulus of the scale is indicated, that is 1:250 000 is encoded as 250000.

Unit: none

Minimum range: 0

Range closure: Left half-open ray $(\text{minimum} < \text{scale value minimum})$

Example: **250000** for a scale of 1:250000

Remarks:
No remarks.

28.19 significant features detected

IHO Definition: SIGNIFICANT FEATURES DETECTED. A statement expressing if significant features have or have not been detected in the course of a survey.

Attribute Type: Boolean

Indication: A True value is an indication that the characteristics of a hydrographic survey are such that significant seafloor features could be detected.

Remarks:

- Remarks:**

 - A feature in this context is any object, whether manmade or not, projecting above the seafloor, which may be a danger for surface navigation (reference: IHO publication S-44). **Significant features detected** does not describe if significant features were actually detected during a hydrographic survey, but whether the survey had the capacity to detect significant features.

28.20 size of features detected

IHO Definition: **SIZE OF FEATURES DETECTED**. The size of detected bathymetric features in an area.

Attribute Type: Real

Unit: cubic metre

Precision: 0.01 cubic metres

Minimum range: 0

Range closure: Left half-open ray (*minimum < size of features detected*)

Example: 32.5 for a survey capable of detecting significant seafloor features of a minimum size of 32.5 cubic metres.

Remarks:

- A feature in this context is any object, whether manmade or not, projecting above the seafloor, which may be a danger for surface navigation (reference: IHO publication S-44).
 - **Size of features detected** does not describe the actual size of features detected during a hydrographic survey, but the size of the smallest feature that the survey was capable of detecting with a high probability.

28.21 source

IHO Definition: **SOURCE.** The publication, document, or reference work from which information comes or is acquired.

Attribute Type: Text

Indication: Source (c...): String of characters.

Example:

Notice to Mariners 3245/24

Remarks:

- The attribute **source** may be populated with the corresponding paper chart Notice to Mariners or Notices to Skippers numbers, although other references are permitted.
 - The attribute **source** should contain no more than 150 characters.

28.22 survey authority (SURATH)

IHO Definition: **SURVEY AUTHORITY**. The authority which was responsible for the survey. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2,200, November 2000).

Attribute Type: Text

Indication: Survey authority (c...): String of characters.

Format: c

Example: Australian Hydrographic Office

Port of

- Remarks:
- The attribute “survey authority” encodes the name of the source survey authority.

28.23 survey type (SURTYP)

IHO Definition: **SURVEY TYPE.** Classification of the different survey types.

Attribute Type: Enumeration

1) **reconnaissance/sketch survey**

IHO Definition: A survey made (due to lack of time or facilities) to a lower degree of accuracy and detail than the chosen scale would normally indicate. (IHO Dictionary – S-32).

2) **controlled survey**

IHO Definition: A thorough survey usually conducted with reference to guidelines. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.203, November 2000).

4) **examination survey**

IHO Definition: A survey principally aimed at the investigation of underwater obstructions and dangers. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.203, November 2000).

5) **passage survey**

IHO Definition: A survey where soundings are acquired by vessels on passage. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.203, November 2000).

6) **remotely sensed**

IHO Definition: A survey where features have been positioned and delimited using remote sensing techniques. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.203, November 2000).

7) **full coverage**

IHO Definition: A survey achieving 100% coverage using systematic, controlled techniques providing full seafloor coverage or full coverage to a defined depth and an investigation of all contacts.

8) **systematic survey**

IHO Definition: A controlled survey but full coverage may not have been achieved.

9) **non-systematic survey**

IHO Definition: A survey of lower quality than a full coverage and systematic survey. Such surveys may be further categorized as reconnaissance, sketch, track, passage, remotely sensed and spot-sounding surveys.

10) **inadequately surveyed**

IHO Definition: Not surveyed to modern standards; or due to its age, scale, or positional or vertical uncertainties is not suitable to the type of navigation expected in the area. (Adapted from IHO Data Quality Working Group (DQWG)).

11) **spot-sounding survey**

IHO Definition: A survey that uses a regular (for example grid) or irregular pattern of soundings obtained one at a time, and normally with very wide spacing.

12) **acoustically swept survey**

IHO Definition: A controlled, systematic survey to standard accuracy; using modern survey echo sounder with sonar sweep.

13) **mechanically swept survey**

IHO Definition: Swept areas where the clearance depth is accurately known but the actual seabed depth is not accurately known.

Remarks:

No remarks.

28.27 uncertainty variable factor

IHO Definition: **UNCERTAINTY VARIABLE FACTOR.** The factor to be applied to the variable component of an uncertainty equation so as to provide the best estimate of the variable horizontal or vertical accuracy component for positions, depths, heights, vertical distances and vertical clearances.

Attribute Type: Real

Indication: The fraction that equates to the factor (or percentage) contributing to the variable uncertainty component is indicated, that is a factor of 5% is encoded as 0.05.

Precision: 0·01

Minimum range: 0

Maximum range: 1

Range closure: Open interval (*minimum < uncertainty variable factor < maximum*)

Example: The positional accuracy for the highest accuracy for hydrographic data in a **Spatial Quality** feature is quoted as “±5 metres + 10% depth”. The variable component in this example is depth, and the factor to be applied to the depth at a location in order to provide the variable uncertainty is **0.1**.

In this example, at a depth of 25 metres, the variable uncertainty would be 2.5 metres, and the overall best estimate of the positional accuracy would be ±7.5 metres.

Remarks:

No remarks.

29 Complex Attributes

29.1 contact address

IHO Definition: **CONTACT ADDRESS.** Direction or superscription of a letter, package, etc., specifying the name of the place to which it is directed, and optionally a contact person or organisation who should receive it.

Indication: The complex attribute provides the encoder with options to encode all details of a contact address.

<u>Sub-attributes:</u>	administrative division	see clause x
	city name	see clause x
	country name	see clause x
	delivery point	see clause x
	postal code	see clause x

Remarks:

No remarks.

29.2 directional character

IHO Definition: **DIRECTIONAL CHARACTER.** A directional light is a light illuminating a sector of very narrow angle and intended to mark a direction to follow. (IHO Dictionary – S-32).

Indication: The complex attribute defines whether the light is a moiré effect light and encodes the orientation of the directional light sector.

<u>Sub-attributes:</u>	moiré effect	see clause 27.181
	orientation	see clause 29.15

Remarks:

No remarks.

29.3 feature name

IHO Definition: **FEATURE NAME.** Provides the name of an entity, defines the national language of the name, and provides the option to display the name at various system display settings.

Indication: The complex attribute provides the encoder with options as to the name to display in certain system display settings.

<u>Sub-attributes:</u>	language	see clause 27.164
	name	see clause 27.188
	name usage	see clause 27.189

Remarks:

- For further information regarding the population of the complex attribute **feature name**, in particular the encoding of multiple instances of **feature name** for a single feature instance, see clause 2.5.8.

29.4 features detected

IHO Definition: **FEATURES DETECTED.** The uniform assessment of detected features.

Indication:

<u>Sub-attributes:</u>	least depth of detected features measured	see clause 28.6
	significant features detected	see clause 28.19
	size of features detected	see clause 28.20

Remarks:

- A feature in this context is meant to be any object, whether manmade or not, projecting above the seafloor, which may be a danger for surface navigation. (Refer IHO document S-44). **features detected** does not describe if features were actually detected during a hydrographic survey, but whether the survey had the capacity to detect features.

29.5 fixed date range

IHO Definition: **FIXED DATE RANGE**. An active period of a single fixed event or occurrence, as the date range between discrete start and end dates.

Indication: The complex attribute describes single fixed period, as the date range between its sub-attributes.

Sub-attributes: **date end** see clause 27.116
date start see clause 27.118

Remarks:

- The sub-attributes **date start** and **date end** must be encoded in the format YYYYMMDD; using 4 digits for the calendar year (YYYY) and, optionally, 2 digits for the month (MM) (for example April = 04) and 2 digits for the day (DD). When no specific month and/or day is required/known, the values are replaced with dashes (-).

29.6 frequency pair

IHO Definition: **FREQUENCY PAIR**. A pair of frequencies for transmitting and receiving radio signals. The shore station transmits and receives on the frequencies indicated.

Indication: The complex attribute describes all variations of radio receiving and transmitting.

Sub-attributes: **frequency shore station receives** see clause 27.146
frequency shore station transmits see clause 27.147

Remarks:

No remarks.

29.7 horizontal clearance fixed

IHO Definition: **HORIZONTAL CLEARANCE FIXED**. The horizontal clearance measured between two points for a fixed span.

Indication: The complex attribute encodes the horizontal distance

Sub-attributes: **horizontal clearance value** see clause 27.154
horizontal distance uncertainty see clause 28.5

Remarks:

No remarks.

29.8 horizontal clearance open

IHO Definition: **HORIZONTAL CLEARANCE OPEN**. The horizontal clearance measured between two points for an opening span.

Indication: The complex attribute encodes the horizontal distance

Sub-attributes: **horizontal clearance value** see clause 27.154
horizontal distance uncertainty see clause 28.5

Remarks:

No remarks.

29.9 horizontal position uncertainty (POSACC)

IHO Definition: **HORIZONTAL POSITION UNCERTAINTY.** The best estimate of the accuracy of a position. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.255, November 2000).

Indication: The complex attribute encodes the horizontal uncertainty associated with any horizontal measurement.

Sub-attributes: **uncertainty fixed** see clause 28.26
uncertainty variable factor see clause 28.27

Remarks:

- The expected input is the maximum of the two-dimensional error. The error is assumed to be positive and negative.

29.10 information

IHO Definition: **INFORMATION.** Textual information about the feature. The information may be provided as a string of text or as a file name of a single external text file that contains the text. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Pages 2.141 and 2.209, November 2000).

Indication: The complex attribute provides additional textual information that cannot be provided using other allowable attributes for the feature, and defines the language of the text string.

Sub-attributes: **file locator** see clause 27.142
file reference see clause 27.143
headline see clause 27.151
language see clause 27.164
text see clause 27.243

Remarks:

- At least one of the sub-attributes **file reference** or **text** must be populated.
- The files referenced by the sub-attribute **file reference** generally contain long text strings or those that require formatting; there is no restriction on the type of text (except for lexical level) that can be held in files referenced by sub-attribute **file reference**.
- The sub-attribute **file locator** cannot be populated unless the attribute **file reference** is populated.
- For further information on the population of **information**, see clause 2.4.6.
- This complex attribute should be used, for example, to hold the information that is shown on paper charts by cautionary and explanatory notes.

29.11 light sector

IHO Definition: **LIGHT SECTOR.** A sector is the part of a circle between two straight lines drawn from the centre to the circumference. (Advanced Learner's Dictionary, 2nd Edition).

Indication:

Sub-attributes: **colour** see clause 27.105
directional character see clause 29.1
light visibility see clause 27.167
sector limit see clause 29.23
value of nominal range see clause 27.268
sector information see clause 29.22
sector arc extension see clause 30.3

Remarks:

No remarks.

29.12 measured distance value

IHO Definition: **MEASURED DISTANCE VALUE.** The distance value indicated on a distance mark, or the distance between two measured distance marks.

Indication:

<u>Sub-attributes:</u>	distance unit of measurement	see clause 27.133
	reference location	see clause 27.210
	waterway distance	see clause 27.280

Remarks:

No remarks.

29.13 multiplicity of features

IHO Definition: **MULTIPLICITY OF FEATURES.** The number of features of identical character that exist as a co-located group. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.150, November 2000).

Indication: The complex attribute provides an indication as to whether the true number of features is known and, where known, the number of features.

<u>Sub-attributes:</u>	multiplicity known	see clause 27.182
	number of features	see clause 27.196

Remarks:

- The attribute **multiplicity of features** must only be used to indicate the number of entities of a feature that are co-located (for example 3 overhead cables suspended over a body of water between 2 pylons), and this information is considered to be of use to the boatmaster. Where possible, features must be encoded individually.

29.14 online resource

IHO Definition: **ONLINE RESOURCE.** Information about online sources from which a resource or data can be obtained. (Adapted from ISO 19115).

Indication: The complex attribute describes the access to online resources according to ISO 19115.

<u>Sub-attributes:</u>	headline	see clause 27.151
	linkage	see clause 27.168
	name of resource	see clause 27.188

Remarks:

No remarks.

29.15 orientation

IHO Definition: **ORIENTATION.** The angular distance measured from true north to the major axis of the feature. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

Indication: The complex attribute provides the orientation value together with a measure of the uncertainty of the value.

<u>Sub-attributes:</u>	orientation uncertainty	see clause 28.14
	orientation value	see clause 27.199

Remarks:

No remarks.

29.16 periodic date range

IHO Definition: **PERIODIC DATE RANGE.** The active period of a recurring event or occurrence.

Indication: The complex attribute describes the active period for a seasonal feature (for example a buoy), as the dates between its sub-attributes.

Sub-attributes: **date end** see clause 27.116
date start see clause 27.118

Remarks:

- The sub-attributes **date start** and **date end** must be encoded in the format ----MMDD; using 2 digits for the month (MM) (for example April = 04) and 2 digits for the day (DD). When no specific day is required/known, the values are replaced with dashes (-).

29.17 power characteristics

IHO Definition: Characteristics of the power supply available

Sub-attributes:

Category of Voltage (see clause 7.203)
Category of Frequency (see clause 7.250)
Amount of Amperage (see clause 7.285)
Category of Plug (see clause 7.229)
Number of Shore Connectors (see clause 7.109)
Allowed Consumption (see clause 7.286)

Remarks:

No remarks.

29.18 radar wave length (RADWAL)

IHO Definition: **RADAR WAVE LENGTH.** The distance between two successive peaks (or other points of identical phase) on an electromagnetic wave in the radar band of the electromagnetic spectrum. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.172, November 2000).

Indication: The complex attribute describes the wave length, as the combination of its sub-attributes.

Sub-attributes: **radar band** see clause 27.205
wave length value see clause 27.281

Remarks:

No remarks.

29.19 rhythm of light

IHO Definition: **RHYTHM OF LIGHT.** The sequence of times occupied by intervals of light/sound and eclipse/silence for all light characteristics or sound signals.

Indication: The complex attribute describes the rhythm of a light (or a light sector).

Sub-attributes: **light characteristic** see clause 27.166
signal group see clause 27.224
signal period see clause 27.225

signal sequence	see clause 29.27
------------------------	------------------

Remarks:
No remarks.

29.20 schedule by day of week

IHO Definition: **SCHEDULE BY DAY OF WEEK.** The nature and timings of a daily schedule by days of the week.

Indication: The complex attribute encodes the regular schedule for a service.

Sub-attributes: **category of schedule** see clause 27.80
time intervals by day of week see clause 29.36

Remarks:
No remarks.

29.21 sector characteristics

IHO Definition: **SECTOR CHARACTERISTICS.** Describes the characteristics of a light sector.

Indication: The complex attribute describes the characteristics of a light sector.

Sub-attributes: **light characteristic** see clause 27.166
light sector see clause 29.11
signal group see clause 27.224
signal period see clause 27.225
signal sequence see clause 29.27

Remarks:
No remarks.

29.22 sector information

IHO Definition: **SECTOR INFORMATION.** Additional textual information about a light sector.

Indication: The complex attribute provides additional textual information that cannot be provided using other allowable attributes for the feature, and defines the language of the text string.

Sub-attributes: **language** see clause 27.164
text see clause 27.243

Remarks:

- This complex attribute should be used, for example, to hold the information related to the characteristics of a complex light sector.
- No formatting of text is possible within **sector information**. If formatted text is required, then an associated text file referenced by the complex attribute **information**, sub-attribute **file reference** must be used (see clause 27.143).

29.23 sector limit

IHO Definition: **SECTOR LIMIT.** A sector is the part of a circle between two straight lines drawn from the centre to the circumference. (Advanced Learner's Dictionary, 2nd Edition).

The sector limit specifies the limits of the sector in a clockwise direction around the central feature (for example a light). (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.184, November 2000).

Indication: The complex attribute describes the angle of a light sector as defined by the sub-attributes.

Sub-attributes: **sector limit one** see clause 29.24
sector limit two see clause 29.25

Remarks:

No remarks.

29.24 sector limit one (SECTR1)

IHO Definition: **SECTOR LIMIT ONE.** A sector is the part of a circle between two straight lines drawn from the centre to the circumference. (Advanced Learner's Dictionary, 2nd Edition).

sector limit one specifies the first limit of the sector. The order of **sector limit one** and **sector limit two** is clockwise around the central feature (for example a light). (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.184, November 2000).

Indication: The complex attribute describes the line or bearing of a light where the character changes or the light is obscured.

Sub-attributes: **sector bearing** see clause 27.219
sector line length see clause 27.220

Remarks:

- The values given to the common limits of adjacent sectors should be identical.
- The orientation of the bearing is from seaward to the central feature. This conforms with the method used in "List of Lights" publications.
- A generic term such as "to shore" cannot be used; a specific bearing must be encoded. Where a light sector limit is defined as "to the shore", it should be encoded using a value that ensures that, when the limit is drawn, it will fall entirely on land.

29.25 sector limit two (SECTR2)

IHO Definition: **SECTOR LIMIT TWO.** A sector is the part of a circle between two straight lines drawn from the centre to the circumference. (Advanced Learner's Dictionary, 2nd Edition).

sector limit two specifies the second limit of the sector. The order of **sector limit one** and **sector limit two** is clockwise around the central feature (for example a light). (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.184, November 2000).

Indication: The complex attribute describes the line or bearing of a light where the character changes or the light is obscured.

Sub-attributes: **sector bearing** see clause 27.219
sector line length see clause 27.220

Remarks:

- The values given to the common limits of adjacent sectors should be identical.
- The orientation of the bearing is from seaward to the central feature. This conforms with the method used in "List of Lights" publications.
- A generic term such as "to shore" cannot be used; a specific bearing must be encoded. Where a light sector limit is defined as "to the shore", it should be encoded using a value that ensures that, when the limit is drawn, it will fall entirely on land.

29.26 shape information

IHO Definition: **SHAPE INFORMATION.** Textual information about the shape of a non-standard topmark.

Indication: The complex attribute provides additional textual information that cannot be provided using the attribute **topmark/daymark shape**.

<u>Sub-attributes:</u>	language	see clause 27.164
	text	see clause 27.243

Remarks:

- No formatting of text is possible within **shape information**. If formatted text is required, then an associated text file referenced by the complex attribute **information** must be used (see clause 29.9).

29.27 signal sequence (SIGSEQ)

IHO Definition: **SIGNAL SEQUENCE.** The sequence of times occupied by intervals of light/sound and eclipse/silence for all “light characteristics” or sound signals. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.191, November 2000).

Indication: The complex attribute provides the signal sequence for non-fixed lights and sound signals.

<u>Sub-attributes:</u>	signal duration	see clause 27.221
	signal status	see clause 27.226

Remarks:

No remarks.

29.28 source indication

IHO Definition: Information about the source document, publication, or reference from which object data or textual material included or referenced in a dataset are derived.

Attribute Type: Complex

<u>Sub-attributes:</u>	reported date	see clause 27.216
	category of authority	see clause 27.20
	country name	see clause 27.110
	source type	see clause 27.230
	source	see clause 27.228
	feature name	see clause 29.3

Remarks:

- Content of featureName is source authority name.
- see also **Fehler! Verweisquelle konnte nicht gefunden werden.**

Inland specific encoding Instructions:

US: The source indicatio is a mandatory attribute and must be coded for all features in the IENC. All features in the Data Classification and Encoding Guide state that **source indication** is Conditional (C); the condition that must be met is that it is a US produced chart.

EUR: The source indication must only be coded for a feature in an IENC when the source is different from the producer of the IENC and the producer wants to exclude liability.

BR: SORIND is an optional attribute which may be used for an object in an IENC when the source is different from the producer of the IENC.

29.29 spatial accuracy

IHO Definition: **SPATIAL ACCURACY.** Provides an indication of the vertical and horizontal positional uncertainty of bathymetric data, optionally within a specified date range.

Indication: The complex attribute defines the horizontal and vertical position accuracy of bathymetric features, which may optionally be degraded over time.

<u>Sub-attributes:</u>	fixed date range	see clause 29.5
	horizontal position uncertainty	see clause 29.9
	vertical uncertainty	see clause 29.42

Remarks:

- See clauses 3.8 and 24.5 for encoding guidance for the population of the sub-complex attributes **horizontal position uncertainty** and **vertical uncertainty**.

29.30 speed

IHO Definition: **SPEED.** Rate of motion. The terms speed and velocity are often used interchangeably, but speed is a scalar, having magnitude only, while velocity is a vector quantity, having both magnitude and direction. (Adapted from IHO Dictionary, S-32).

Indication: The complex attribute encodes the range of the speed at a location.

<u>Sub-attributes:</u>	speed maximum	see clause 27.232
	speed minimum	see clause 27.233

Remarks:

No remarks.

29.31 surface characteristics

IHO Definition: **SURFACE CHARACTERISTICS.** The general nature of the material of which the land surface or the seabed is composed.

Indication:

<u>Sub-attributes:</u>	nature of surface	see clause 27.194
	nature of surface – qualifying terms	see clause 27.195
	underlying layer	see clause 27.258

Remarks:

No remarks.

29.32 survey date range

IHO Definition: **SURVEY DATE RANGE.** The complex attribute describes the period of the hydrographic survey, as the time between its sub-attributes.

Indication: The complex attribute describes the period of the hydrographic survey, as the time between its sub-attributes.

<u>Sub-attributes:</u>	date end	see clause 27.116
	date start	see clause 27.118

Remarks:

- The sub-attributes **date start** and **date end** must be encoded using 4 digits for the calendar year (YYYY) and, optionally, 2 digits for the month (MM) (for example April = 04) and 2 digits for the day (DD). When no specific month and/or day is required/known, indication of the month and/or day is replaced with dashes (-).

29.33 telecommunications

IHO Definition: **TELECOMMUNICATIONS.** A means or channel of communicating at a distance by electrical or electromagnetic means such as telegraphy, telephony, or broadcasting.

Indication: The complex attribute describes the different telecommunications methods and contact details.

<u>Sub-attributes:</u>	contact instructions	see clause 27.109
	telecommunication identifier	see clause 27.241
	telecommunication service	see clause 27.242

Remarks:

- If no value is populated for the sub-attribute **telecommunication service**, this means the service is by voice communication.

29.34 tidal stream panel values

IHO Definition: **TIDAL STREAM PANEL VALUES.** The direction of the flow and the tidal current rate from 6 hours before to 6 hours after high water (HW) or low water (LW) at the reference tide station, at hourly or sub-hourly intervals. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.210, November 2000).

Indication:

<u>Sub-attributes:</u>	reference tide	see clause 27.211
	reference tide type	see clause 27.212
	stream depth	see clause 27.239
	tidal stream value	see clause 29.35

Remarks:

No remarks.

29.35 tidal stream value

IHO Definition: **TIDAL STREAM VALUE.** A measurement of the direction and speed of a tidal stream at a given time relative to the reference tide.

Indication:

<u>Sub-attributes:</u>	orientation	see clause 29.15
	speed maximum	see clause 27.232
	time relative to tide	see clause 27.250

Remarks:

No remarks.

29.36 time intervals by day of week

IHO Definition: **TIME INTERVALS BY DAY OF WEEK.** The regular weekly operation times of a service or schedule.

Indication: The complex attribute describes the timings for a regular service schedule.

<u>Sub-attributes:</u>	day of week	see clause 27.120
	day of week is range	see clause 27.121
	time of day end	see clause 27.248
	time of day start	see clause 27.249

Remarks:

- At least one of the sub-attributes **day of week**, **time of day start** or **time of day end** must be encoded. Where populated, the number of instances of **time of day start** must be the same as the number of instances of **time of day end**.

- The sub-attribute **day of week is range** indicates whether an instance of **time intervals by day of week** encodes a range of days or discrete days. The day(s) or day range(s) are encoded using sub-attribute **day of week**. Where **day of week is range** is populated as *True*, there must be exactly two instances of the attribute **day of week**. If **day of week** is not populated, this indicates that the same schedule applies every day (Monday through Sunday). Multiple ranges or mixing range with discrete days(s) is not allowed (if this is required another instance of **time intervals by day of week** must be encoded).
- An indeterminate range may be indicated with a null value at the appropriate position in the sequence.

29.37 topmark (**TOPMAR**)

IHO Definition: **TOPMARK**. A characteristic shape secured at the top of a buoy or beacon to aid in its identification. (IHO Dictionary – S-32).

Indication:

<u>Sub-attributes:</u>	colour	see clause 27.105
	colour pattern	see clause 27.106
	topmark/daymark shape	see clause 27.252
	shape information	see clause 29.26

Remarks:

No remarks.

29.38 vertical clearance closed

IHO Definition: **VERTICAL CLEARANCE CLOSED**. The vertical clearance of a feature in closed condition (for example a closed lifting bridge) measured from the horizontal plane towards the feature overhead. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.235, November 2000).

Indication: The complex attribute encodes the vertical distance from a defined vertical datum to the underside of a an opening overhead feature when it is in the closed position.

<u>Sub-attributes:</u>	vertical clearance value	see clause 27.271
	vertical uncertainty	see clause 29.42

Remarks:

No remarks.

29.39 vertical clearance fixed

IHO Definition: **VERTICAL CLEARANCE FIXED**. The vertical clearance measured from the horizontal plane towards a fixed (non-opening) feature overhead. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.234, November 2000).

Indication: The complex attribute encodes the vertical distance from a defined vertical datum to the underside of a fixed overhead feature.

<u>Sub-attributes:</u>	vertical clearance value	see clause 27.271
	vertical uncertainty	see clause 29.42

Remarks:

- In the case of cables carrying high voltages an additional clearance of from 2 to 5 metres may be needed to avoid an electrical discharge. When known, the authorised safe clearance (known in the UK as the Safe Overhead Clearance) which is the physical clearance minus a safety margin shall be stated, using the attribute **vertical clearance safe** (see clause 29.41). **vertical clearance fixed** must not be used to populate authorized safe clearances.

29.40 vertical clearance open

IHO Definition: **VERTICAL CLEARANCE OPEN.** The vertical clearance of a feature in opened condition (for example an open lifting bridge) measured from the horizontal plane towards the feature overhead. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.236, November 2000).

Indication: The complex attribute encodes the vertical distance from a defined vertical datum to the underside of an opening overhead feature when it is in the open position.

Sub-attributes:

vertical clearance unlimited	see clause 27.270
vertical clearance value	see clause 27.271
vertical uncertainty	see clause 29.42

Remarks:

No remarks.

29.41 vertical clearance safe

IHO Definition: **VERTICAL CLEARANCE SAFE.** The safe vertical clearance of a feature measured from the horizontal plane towards the feature overhead. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.237, November 2000).

Indication: The complex attribute encodes the safe vertical distance from a defined vertical datum to the lowest point of an electrical cable over navigable water.

Sub-attributes:

vertical clearance value	see clause 27.271
vertical uncertainty	see clause 29.42

Remarks:

No remarks.

29.42 vertical uncertainty (SOUACC, VERACC)

IHO Definition: **VERTICAL UNCERTAINTY.** The best estimate of the vertical accuracy of depths, heights, vertical distances and vertical clearances.

Indication: The complex attribute encodes the vertical uncertainty associated with any vertical measurement.

Sub-attributes:

uncertainty fixed	see clause 28.26
uncertainty variable factor	see clause 28.27

Remarks:

No remarks.

29.43 vessel speed limit

IHO Definition: **VESSEL SPEED LIMIT.** The maximum allowed rate of travel for a vessel in an area in knots.

Indication: The complex attribute describes the speed limit for vessels in an area where speed is restricted.

Sub-attributes:

speed limit	see clause 27.230
speed units	see clause 27.235
vessel class	see clause 27.275

Remarks:

- The speed limit in an area may differ for different classes of vessel.

29.44 zone of confidence

IHO Definition: **ZONE OF CONFIDENCE.** The overall indication of the quality of bathymetric data within an area based on the positional accuracy, survey equipment and coverage; optionally within a specified data range.

Indication: The complex attribute defines the overall indication of the quality of bathymetric data, which may optionally be degraded over time.

<u>Sub-attributes:</u>	category of zone of confidence in data	see clause 27.102
	fixed date range	see clause 29.5
	horizontal position uncertainty	see clause 29.9
	vertical uncertainty	see clause 29.42

Remarks:

- See clauses 3.8 and 24.5 for encoding guidance for the population of the sub-complex attributes **horizontal position uncertainty** and **vertical uncertainty**.

30 ECDIS System (Portrayal) Attributes

30.1 default clearance depth

IHO Definition: **DEFAULT CLEARANCE DEPTH.** The depth value determined for an underwater hazard of unknown depth, based on the depth of the surrounding area.

Attribute Type: Real

Unit: Defined as an attribute in the IENC Dataset Discovery Metadata: metre (m)

Precision: 0·1m

Minimum range: -30

Maximum range: 12500

Range closure: Open interval ($\text{minimum} < \text{default clearance depth} < \text{maximum}$)

Examples: 12.5 for a default clearance depth of 12.5 metres

-2.4 for a drying default clearance height of 2.4 metres

Remarks:

- Remarks:**

 - The attribute **default clearance depth** must be populated with a value, which must not be an empty (null) value, only if the attribute **value of sounding** for the feature instance is populated with an empty (null) value and the attribute **height**, if an allowable attribute for the feature, is not populated.
 - The value for **default clearance depth** is determined from the attribute **depth range minimum value** for the surrounding encoded **Depth Area(s)** or **Dredged Area** (see clauses 11.4 and 11.6) in accordance with the Tables below. For an area feature covered by more than one depth area, the **default clearance depth** is determined based on the **depth range minimum value** of the shoalest of the depth areas covering the feature.
 - The auto-populated value for **default clearance depth** may be amended by the Data Producer if the resulting isolated danger indication in the Inland ECDIS or ECS is not considered appropriate (if, for example, it is known that vessels having a draught deeper than 20.1 metres are able to navigate safely in the area; or if the Data Producer wishes to indicate that only vessels to a specified draught that is less than 20 metres may navigate safely in the area).
 - A drying height is indicated by a negative value.

The following Tables provide an indication for the values (if relevant) to be populated for the attribute **default clearance depth**. The Tables have been partitioned such that the top section has the precondition that the target feature (**Obstruction**, **Underwater/Awash Rock** or **Wreck**) is completely covered by **Depth Area** and/or **Dredged Area** feature(s) having a known value for the attribute **depth range minimum value**; and the bottom section has the precondition that the target feature is of unknown depth (attribute **value of sounding** = Unknown) and is completely or partially covered by an **Unsurveyed Area** feature, or a **Depth Area** and/or **Dredged Area** feature having an unknown value for the attribute **depth range minimum value**.

In the Tables:

- The symbol “/” indicates that this attribute is not relevant for the feature instance and therefore is not present. Where “/” appears in the **default clearance depth** column, the attribute must not be populated.
 - A blank indicates that the attribute may have any allowable value, including an unknown (empty (null)) value. For non-mandatory attributes, a blank also indicates that the attribute may not be present.
 - Where attribute values are quoted:
 - Enumerate values separated by commas indicate that any one of the listed values may be populated;
 - “Known” means that the attribute is mandatory and has been populated with a value;
 - “Unknown” means that the attribute is mandatory and is therefore present, but has not been populated with a value;
 - “Empty (null)” means that the attribute is not mandatory, but is present and has no value. For the purposes of these Tables, “Empty (null)” also equates to the non-mandatory attribute not being present for the feature instance.
 - “Least Depth” in the **default clearance depth** column is related to the underlying Skin of the Earth depth feature(s) where the value for attribute **depth range minimum value** for the covering **Depth Area** and/or **Dredged Area** feature(s) is known, and is determined as follows:
 - For features of geometric primitive point covered by a **Depth Area** or **Dredged Area** feature; or for features of geometric primitive curve or surface covered by a single **Depth Area** or **Dredged Area**

- feature, the value of the attribute **depth range minimum value** for the **Depth Area** or **Dredged Area**.
- For features of geometric primitive curve or surface covered by multiple **Depth Area** and/or **Dredged Area** features, the shoalest value of the attribute **depth range minimum value** for the **Depth Area/Dredged Area** features.

category of obstruction	exposition of sounding	height	value of sounding	water level effect	default clearance depth
For features where all covering depth range minimum values are known					
	/	Known	/	1,2	/
	/	Unknown	/	1,2,7	/
		/	Known	3,4,5, Unknown	/
	1,3	/	Unknown	3	Least Depth
6	2, Empty (null)	/	Unknown		0.1
	2, Empty (null)	/	Unknown	3	0.1
# 6	2, Empty (null)	/	Unknown	5	0
# 6	2, Empty (null)	/	Unknown	4, Unknown	-15
For features of unknown depth, covered or partially covered by Unsurveyed Area; or Depth/Dredged Area where depth range minimum value is unknown					
6		/	Unknown		0.1
		/	Unknown	3	0.1
# 6		/	Unknown	5	0
# 6		/	Unknown	4, Unknown	-15

Table 30.1 – Values for default clearance depth – Obstruction features

exposition of sounding	value of sounding	water level effect	default clearance depth
For features where all covering depth range minimum values are known			
	Known		/
1,3	Unknown	3	Least Depth
2, Empty (null)	Unknown	3	0.1
2, Empty (null)	Unknown	5	0
2, Empty (null)	Unknown	4, Unknown	-15
For features of unknown depth, covered by Unsurveyed Area; or Depth/Dredged Area where depth range minimum value is unknown			
	Unknown	3	0.1
	Unknown	5	0
	Unknown	4, Unknown	-15
	Unknown	3	0.1

Table 30.2 – Values for default clearance depth – Underwater/Awash Rock features

category of wreck	exposition of sounding	height	value of sounding	water level effect	default clearance depth
For features where all covering depth range minimum values are known					
4,5	/	Known	/	1,2, Unknown	/
/		/	Known	3,4,5, Unknown	/
/	1,3	/	Unknown	3	Least Depth
	1,3	/	/	3	Least Depth
1		/	/	1,2,4,5, Unknown	20.1 or {Least Depth – 66} (whichever value is larger)
1	2, Empty (null)	/	/		20.1 or {Least Depth – 66} (whichever value is larger)
/	2, Empty (null)	/	Unknown	3,5	0
/	2, Empty (null)	/	Unknown	4, Unknown	-15
2,3,4,5, Unknown		/	/	1,2,4,5 Unknown	-15
2,3,4,5, Unknown	2, Empty (null)	/	/		-15
For features of unknown depth, covered or partially covered by Unsurveyed Area; or Depth/Dredged Area where depth range minimum value is unknown					
1		/	/	3, Unknown	20.1
/		/	Unknown	3,5	0
/		/	Unknown	4, Unknown	-15
Unknown		/	/	3,5	0
2,3,4,5		/	/	3,5	-15
2,3,4,5, Unknown		/	/	4, Unknown	-15

Table 30.3 – Values for default clearance depth – Wreck features

30.2 in the water

IHO Definition: **IN THE WATER.** An indication if the feature is located in or over navigable water.

Attribute Type: Boolean

Indication: A True value is an indication that the feature is located in or over navigable water.

Remarks:

- A True value is an indication that the feature is to be included in the Inland ECDIS or ECS Base Display viewing group.

30.3 sector arc extension

IHO Definition: **SECTOR ARC EXTENSION.** An indication that the default radius of a sector arc is to be extended by 5mm.

Attribute Type: Boolean

Indication: A True value indicates that a sector arc radius is to be extended 5 millimetres beyond the default. Required where there is more than one light sector covering the same or similar angle.

Remarks:

- The requirement for a sector arc to be extended is calculated by IENC production software systems.

30.4 surrounding depth

IHO Definition: **SURROUNDING DEPTH.** The depth value determined for seabed around an underwater hazard, based on the depth of the surrounding area.

Attribute Type: Real

Unit: Defined as an attribute in the IENC Dataset Discovery Metadata: metre (m)

Precision: 0·1m

Minimum range: -30

Maximum range: 12500

Range closure: Open interval (*minimum < surrounding depth < maximum*)

Example: 20 for a surrounding depth of 20 metres

Remarks:

- The value for **surrounding depth** is determined from the attribute **depth range minimum value** for the surrounding encoded **Depth Area(s)** or **Dredged Area** (see clauses 11.4 and 11.6). For an area feature covered by more than one depth area, the **surrounding depth** is determined as the **depth range minimum value** of the deeper of the depth areas covering the feature.
- **surrounding depth** must be populated with a value, which must not be an empty (null) value.
- For features that fall entirely within an **Unsurveyed Area** feature, **surrounding depth** must be populated with value 0. If an area feature falls partly within **Unsurveyed Area** and partly within **Depth Area** or **Dredged Area** features, **surrounding depth** must be populated in accordance with the first bullet above.
- **surrounding depth** is used by the production software to determine the depth value to be used by the Inland ECDIS or ECS at which a feature is to be considered to be in “safe” or “unsafe” water based on the boatmaster’s selected safety depth.

31 Updating

Remarks:

- An IENC Update will be rejected by the Inland ECDIS or ECS if it is located outside the area of data coverage for the dataset (that is, area covered by the Meta feature **Data Coverage** with attribute **category of coverage** = 1 (coverage available)) or if it changes the extent of this area. Where the area of data coverage for a base IENC dataset is to be changed, this must be done by issuing a New Edition of the dataset.
- It has been reported that grouping new or modified soundings into existing sounding groups (see clause 11.3) in an IENC Update negatively impacts the discovery of the changes to the bathymetry by boatmasters. Therefore, encoders are advised that soundings added or modified as part of an IENC Update should be encoded as individual sounding objects or, if in close proximity, may be included as a single grouped sounding object. When a New Edition of the IENC is produced, soundings may be re-grouped in accordance with the Data Producer's standard practices.
- When updating the geometry of curve features, compilers must note the requirement for the vector records making up the curve feature to be referenced sequentially. Additionally, for curve features comprising multiple edges, the end node of a vector record must be the same as the start node of the following vector record. It has been reported that some Inland ECDIS or ECS reject IENC Updates where the geometry does not conform to these requirements.

31.1 Issuing Updates in advance

Under certain conditions, it may be necessary for a Data Producer to issue Update information in advance. For example, a change in a traffic routeing system must be made public before the new situation is implemented. Within an Update dataset there is no means of indicating the date at which an Update must be applied. Therefore, when an Update dataset is received by an end-user, it must be applied immediately. To avoid situations where Update information would cause target data to reflect a situation that does not yet exist, the following encoding rules must be followed:

- a) If the advance Update information contained in the Update message involves the addition of features to the existing data (for example a new lighthouse), the **date start** sub-attribute for the complex attribute **fixed date range** on the new features must contain the date at which the Update becomes active.
- b) If the advance Update information contained in the Update message involves the modification of existing features (for example a change in a traffic routeing system), it must be treated as a deletion of the existing features and replacement with new features. See a) above and c) below.
- c) If the advance Update information contained in the Update message involves the deletion of existing features (for example the removal of a buoy), the Update message must set the **end date** sub-attribute for the complex attribute **fixed date range** of all features to be deleted to the date at which the Update becomes active. **NB.** This Update message does not actually delete the features from the dataset, it simply indicates that on the date held in the **date end** sub-attribute for the complex attribute **fixed date range** they become obsolete. A further Update to actually delete the obsolete features from the dataset should be sent at the time that the change in the real world occurs.
- d) To highlight to the boatmaster that the advance Update information contained in an Update message will take place in the future, it is recommended that a **Caution Area** feature (see clause 16.11) be created covering the location at which the future changes will take place. A warning note specifying, in plain language, the nature of the future change should be encoded, using the complex attribute **information** (see clause 2.4.6). The sub-attribute **date end** for the complex attribute **fixed date range** on the **Caution Area** must be set to the date at which the change described in the Update becomes active.

Changes to the **date start** and **date end** for **fixed date range** cannot be applied to spatial types. Therefore, a change to the geometry of a real world feature (for example the relocation of a buoy) to be applied in the future can only be achieved by updating all of the geo and spatial types involved.

As a consequence of issuing advance information Updates, more than one instance of a particular real world feature could exist in the dataset.

Further information regarding issuing Update information in advance can be found at clause 31.2.3.

31.1.1 Advance notification of changes to traffic separation schemes

It is important that boatmasters be provided with advance notification of changes to traffic separation schemes (TSS), which may include modification to an existing TSS, addition of a new TSS or removal of a TSS. In order to provide a consistent approach to boatmasters regarding advance notification of changes to a traffic separation scheme, the following procedure should be adopted:

- 1) At least one month before the changes to the TSS come into force, issue an updated dataset (as an Update or a New Edition) which:
 - Adds new or amended TSS component features. These features must have **date start** for **fixed date range** populated with the date that the changes to the TSS come into force.
 - Adds **date end** for **fixed date range** (populated with the date of the day before the changes to the TSS come into force) to any component features of the existing TSS that are to be changed or deleted.
 - Creates a **Caution Area** surface feature (see clause 16.11) covering the geographic extent of both the current and the future TSS. The complex attribute **information** (see clause 2.4.6) must be used to explain the change to the TSS, for example "*The traffic separation scheme off Cape Bon is to be modified at 0000 UTC on 1 July 2009. This IENC includes all the information before and after the change, indicated by the sub-attributes **date end** (before the change) and **date start** (after the change) for the complex attribute **fixed date range** on the components of the scheme*". The sub-attribute **date end** on **fixed date range** for the **Caution Area** should be populated with the date at which the change comes into force or, if encoders wish to provide extended information to the Mariner that a change has been made, with a date up to a month after the change comes into force. If the current and the future TSS are not in the same geographic area, it may be required to encode two distinct **Caution Area** surface features. A picture file may be referenced by the **Caution Area** using the attribute **pictorial representation** if it is considered useful, for example the equivalent paper chart representation of the amended or new TSS.
- 2) As soon as possible after the modified/new/deleted TSS comes into force, issue an updated dataset (as an Update or New Edition) which:
 - Deletes the changed or redundant component features of the former TSS.
 - Removes the attribute **fixed date range** from the component features of the new TSS.
- 3) The **Caution Area** must also be removed by Update, either as part of the Update to remove the redundant component features of the former TSS, or as a separate Update at a later date, corresponding to the date populated in the sub-attribute **date end** for the complex attribute **fixed date range** for the **Caution Area**.

31.2 Guidelines for encoding Temporary and Preliminary IENC Updates

31.2.1 Introduction

The following provides high level guidance for the promulgation of the equivalent of paper chart Temporary (T) and Preliminary (P) Notices to Mariners (NMs) via IENC Updates. This guidance allows for some latitude in its application and is dependent on the assessment of each particular case, and as such relies ultimately on the judgement of each IENC producer.

31.2.2 Temporary (T) Notices to Skippers

1. In the maritime area Temporary Notices to Mariners, (T)NMs, for paper charts are defined in S-4, Section B-600. A (T)NM promulgates navigationally significant information that will remain valid only for a limited period of time.

For the paper chart, the convention is for the Mariner to insert the Update on the chart in pencil, and erase it when the (T)NM is cancelled.

S-401 provides mechanisms which allow IENCs to be automatically updated. This allows the affected IENC(s) to be continually updated in a timely manner for the duration of the NM without additional workload for the boatmaster.

Producers must promulgate temporary information which is safety-related or which otherwise needs to be advised to the boatmaster urgently by IENC Update to provide the Inland ECDIS or ECS user

with an updated System Database. This service corresponds to the service that (T)NMs offer to the paper chart user.

2. Update encoding for an IENC and (T)NM for the paper chart are two completely different communication processes for promulgating information to the Mariner/boatmaster. Since these processes are different (but not supposed to be independent), and the products to which they apply are also different, it is recommended that IENC Updates be derived from the source information rather than the paper chart (T)NM. Often the (T)NM for paper chart does not provide enough detail to apply the relevant IENC Update.
3. If possible the information should be encoded with the relevant features. However, producers should consider the following:
 - An IENC Update must not be initiated if the information will no longer be valid by the time it is received by the boatmaster; this will depend upon the timescales relating to the Producer Nation's IENC Updating regime. Shorter time periods may be covered by other services, e.g. Notices to Skippers. If known, the IENC Update should include an indication of how long the temporary change will remain in force.
 - If it is unlikely that the producer will be notified when a temporary change will revert to its original charted state, the producer should consider an alternative method such as a general note or by issuing an IENC Update explaining, for example, that the aids to navigation within an area are reported to be unreliable.

It is important that producers should consider constraints of time when identifying the encoding method. Time consuming and unnecessarily complex methods of encoding should be avoided.

4. The overuse of **Caution Area** features (especially **Caution Area** of type surface – see clause 16.11) for temporary information should be avoided. The **Caution Area** feature is used when it is relevant for the situation and/or when a particular change needs a special warning. **Caution Area** may be used when the relevant features cannot be encoded, for example information cannot be displayed clearly or cannot be easily promulgated due to time constraints.
5. To correctly encode an IENC Update the source information is essential in determining which elements of the Update are reliable, which are permanent and which are temporary. The attribute **status** with value 7 (temporary) should only be used in an Update when it is certain that the status of a feature is confirmed as temporary.

6. Use of complex attribute **fixed date range**:

The earliest date on which a feature will be present (**date start**) and the latest date on which a feature will be present (**date end**) must only be encoded when known. Where such dates have been encoded for any feature that is the structure component of a **Structure/Equipment** feature association, all other component features within the relationship must not extend beyond the temporal attribute values encoded for the structure feature.

The IENC Update should be issued as close as possible to the earliest date of the change (**date start**), unless it is appropriate to provide the information well in advance. A feature no longer present should be removed from the display by issuing a further Update as soon as possible after the return to the original charted state (**date end**). The timing of the issue of these Updates will depend upon the Producers IENC Updating regime and its corresponding timescales.

When an IENC Update promulgates information well in advance and uses **fixed date range**, a **Caution Area** feature may be used in order to inform boatmasters that temporal information exists at some future point in time.

7. The complex attribute **information** (see clause 2.4.6), sub-attribute **text** should be used as required to provide supplementary or contextual information when encoding temporary (or preliminary) information. When the text is too long to be encoded using **information** (**text**) (see clause 27.243), the complex attribute **information**, sub-attribute **file reference** should be used to encode a reference to an IENC support file. Encoders using **information** to provide positional information must express the coordinate values in WGS 84. If it is deemed necessary a picture file (referenced using attribute **pictorial representation**) may be included.
8. IENC Updates issued for temporary information should be carefully managed and reviewed regularly to consider whether further action is necessary. New information may have been received that

necessitates the issuing of a new Update to modify or cancel the previous one. Producers should make it easy to recover the original charted state before the temporary changes came into effect.

9. Further verification is recommended to make sure that the encoded IENC Update is consistent with the corresponding paper chart Notice to Mariners.

10. Guidelines for typical cases:

- a) Individual new physical features (for example wreck, buoy) with no associated explicit or implicit area associated (for example restricted area):
 - Encode the relevant S-401 feature.
 - In this instance a **Caution Area** feature would not normally be used.
- b) Individual new physical feature(s) with an associated explicit area around it:
 - Encode the relevant S-401 surface feature (for example **Restricted Area**). The relevant feature is encoded for the new physical feature. However, when the area is an “entry prohibited area” or a **Caution Area** feature the new physical feature(s) may be omitted to simplify encoding unless it is navigationally significant.
- c) Individual new physical feature with a notification of caution, for example “Boatmasters are advised to navigate with caution...”:
 - Encode the relevant S-401 feature. Additional clarification and advice may, if required, be provided using the complex attribute **information** (see clause 2.4.6). Exceptionally, a **Caution Area** feature may be encoded to highlight the caution if considered necessary.
- d) Obstructions (including wrecks) reported to exist within an area:
 - Encode an **Obstruction** or **Wreck** feature of type surface (see clauses 13.6 and 13.5).
- e) New simple surface feature (military practice area, dredged area):
 - Encode the relevant S-401 surface feature.
 - Supplementary information is provided using the complex attribute **information** (see clause 2.4.6).
 - Normally, a **Caution Area** feature is not added.
- f) Complex information within an area (for example works in progress where the changes are numerous or involve complex changes to the topology):
 - Encode the surface feature. It should be encoded with the relevant S-401 feature or, if more suitable or by default, a **Caution Area** feature (see clause 16.11). Supplementary or contextual information is provided using the complex attribute **information** (see clause 2.4.6). When the available information is sufficiently detailed, navigationally significant features (for example navigational aids, obstructions) should be encoded or modified within the area. When the available information does not permit this, a **Caution Area** feature defining the area is preferred.
- g) Changes to an existing feature (for example navigational aid):
 - In these instances it is usually only necessary to change the attributes values. A **Caution Area** feature (see clause 16.11) may be used to warn the boatmaster if it is considered necessary.
- h) Buoy temporarily moved:
 - When a buoy is temporarily moved then it, and any associated features, are “moved” to the new position and the attribute **status** = 7 (temporary) is populated. Alternative encodings are possible, for example, if the move is for a fixed period of time. In these cases the feature, and any associated components, can be created in the temporary position with sub-attribute **date end** for the complex attribute **fixed date range** populated with the date corresponding to the end of the fixed period of time. The currently charted feature, and any associated components, should have **date start** for the complex attribute **fixed date range** also populated with the date corresponding to the end of the fixed period of time. A **Caution Area** feature may, if considered necessary, be added.
- i) Light temporarily extinguished:
 - The attribute **status** for the **Light** feature is populated with the values 11 (extinguished) and 7 (temporary).
- j) Change to a maintained depth in a dredged area:

- When information is received from an official or recognised survey authority relating to a dredged area where the dredged depth has changed, the attribute value of **depth range minimum value** for the **Dredged Area** feature should be changed to the value provided by the survey.
- Where a **Sounding** feature is encoded in a dredged area to indicate shoaler depths, the attribute value **exposition of sounding** = 2 (shoaler than the depth of the surrounding depth area) should not be populated (see clauses 11.3.1 and 11.4.1). Where required, the shoal depths should be encoded using **Sounding**, with the appropriate underlying depth information (**Depth Contour** and **Depth Area**) to support the depths. Alternatively, the attribute **depth range maximum value** for the **Dredged Area** may be set to the designed dredged depth for the dredged area and the attribute **depth range minimum value** set to the value of the shoalest depth, or a **Caution Area** feature may be encoded covering the shoaler depth area with the depth information provided using the complex attribute **information** (see clause 2.4.6). Where the shoal depths are close to the edge of the dredged area, the dredged area limit may be adjusted to exclude the shoal depths from the area..

31.2.3 Preliminary (P) Notices to Mariners

1. In maritime areas Preliminary Notices to Mariners, (P)NMs, for paper chart are defined in S-4, Section B-600. A (P)NM promulgates navigationally significant information early to the Mariner, for example when a paper chart new edition cannot be issued in due time.

For the paper chart, the convention is for the Mariner to insert the Update on the chart in pencil, and erase it when the (P)NM is cancelled.

S-401 provides mechanisms which allow IENCs to be automatically updated (Update application profile). This allows the affected IENC(s) to be continually updated in a timely manner for the duration of the NM without additional workload for the boatmaster.

Producers must promulgate preliminary information which is safety-related or which otherwise needs to be advised to the boatmaster urgently by IENC Update to provide the Inland ECDIS or ECS user with an updated System Database. This method of delivery corresponds to the service that (P)NMs offer to the paper chart user.

2. Update encoding for IENC and (P)NM for paper chart are two completely different communication processes for promulgating information to the boatmaster.

For example, there are instances when the paper chart needs updating using a NM block (also known as a chartlet or patch) or by issuing a New Edition due to the complexity or volume of changes. This could clutter the paper chart unacceptably if amended by hand and/or overburden the chart corrector. The lead time for a NM block correction or a New Edition can be lengthy, sometimes several months. In these cases a (P)NM may be issued as an interim measure. The ENC Updating mechanisms are more flexible and may allow for ENC Updates to be issued in quicker time. However, experience has shown that large Updates may result in processing issues in the ECDIS, in particular inordinately long loading times. Therefore producing an ENC New Edition may be the better option in some cases.

There may be other instances, when new information is received, where it is not possible to fully update both the ENC and paper chart promptly. For example, not all the information required to produce a chart-updating NM is received by the HO in the first notification (for instance notification of works in progress or projected), or extensive new information requires significant compilation work. In these cases it is still necessary to provide notification of navigationally significant changes to the Mariner in a timely manner.

Since the paper chart and ENC processes are different (but not supposed to be independent), and also the products to which they apply are different, it is recommended that ENC Updates be derived from the source information rather than from the paper chart (P)NM. It is often the case that the paper chart (P)NM does not provide enough detail to encode the ENC Update exactly as it should be.

3. Simple or more complex encoding methods are possible but it is important for Producers to consider carefully which encoding method is appropriate when creating an IENC Update with due consideration for time.
4. Often, information received is too complex, extensive and/or imprecise to be encoded with the relevant S-401 features. In these instances the use of a **Caution Area** feature (see clause 16.11) is

preferred to give a précis of the overall changes together with detailed navigationally significant information. For complex or extensive changes the **Caution Area** should have the complex attribute **information**, sub-attribute **file reference** referencing a file containing precise details of the preliminary information. See also clause 31.2.2 paragraph 7 above. If the information is less precise then **information** should be used to inform boatmasters of this fact.

It is noted that the boatmaster, if it is considered necessary, has the facility in the Inland ECDIS or ECS to add “Mariner Objects” and annotate them. These can be saved in the System Database based on information provided in textual form using the **information** complex attribute. It is envisaged that these features would be created at the “Route Planning” stage and act as a prompt during the “Route Monitoring” phase.

When information is issued as advance notification for an IENC it is necessary to provide as soon as possible to the boatmaster the final and full charted information encoded with the relevant S-401 features. An IENC Update or a New Edition of the IENC dataset should therefore be issued at a later date when the producer can carry out full encoding of the changes. The period of time will depend on the following:

- the time needed by the producer to undertake the full encoding with relevant features;
 - the time needed to obtain confirmation of details; and
 - the date at which the real world situation is stabilized and any forecast changes have been completed.
5. Source Information received may contain some navigationally significant elements that are simple to encode with the relevant features in a timely manner. In such cases these elements may be encoded with the relevant features provided that they reflect the “real world” situation after the IENC Update is made available to the user. However, if the changes are subject to continual change these features should be amended as a consequence and will represent additional work for the producer. In such cases, the IENC Update should also warn the boatmaster that the situation is subject to change. For temporary information, see clause 31.2.2.
 6. Use of complex attribute **fixed date range**: See clause 31.2.2 paragraph 6. For new or amended routeing measures, see clause 31.1.1.
 7. Use the complex attribute **information**: See clause 31.2.2 paragraph 7.
 8. Diagrams are sometimes very useful to the boatmaster, for example, for indicating changes to complex routeing measures or the introduction of new ones. A picture file may be referenced using the attribute **pictorial representation** in such cases.
 9. IENC Updates issued for preliminary information should be managed and reviewed regularly. For example further source information may have been acquired requiring a further IENC Update. This may add, modify or cancel information previously promulgated.
 10. Further verification is recommended to make sure that the encoded IENC Update is consistent with the corresponding paper notice.
 11. Guidelines for typical cases:
 - a) Traffic separation schemes:
 - See clause 31.1.1. For the use of the complex attribute **fixed date range**, see also clause 31.2.2 paragraph 6.
 - b) Complex information within an area of change (for example works in progress):
 - A **Caution Area** feature (see clause 16.11) should be created to cover the area. Information is provided using the complex attribute **information** (see clause 2.4.6), sub-attribute **text**, for example *under construction*, or sub-attribute **file reference** to encode a reference to an IENC support file when it is necessary to give more detailed information. If sufficiently detailed information is available, then navigationally significant information such as navigational aids, fairways, regulated areas, etc. can be encoded or modified within the **Caution Area** if time permits. A reference to a picture file may also be included, if required, using the attribute **pictorial representation** on the **Caution Area**.
 - Alternatively, and if considered appropriate a **Restricted Area** feature (see clause 17.8), with attribute **restriction** = 7 (entry prohibited) may be encoded instead of the **Caution Area** feature.
 - c) Simple information which does not need an additional notification of caution:

- The relevant feature(s) and the appropriate attributes should be encoded with any additional contextual information provided using the complex attribute **information** (see clause 2.4.6). In this case it is not necessary to use a **Caution Area** feature. This could apply, for example, to submarine cables or pipelines being laid (**Cable Submarine** or **Pipeline Submarine/On Land** features), or an area under reclamation (**Land Area** feature with attribute **condition** = 3 (under reclamation)). If required the encoding should reflect that positions are approximate using the spatial attribute **quality of horizontal measurement** = 4 (approximate) on the spatial type(s).
- d) Depths less than those charted within a defined area:
- If the depth values and their positions are known, **Sounding** features (see clause 11.3) may be created or modified. Any affected depth contours and depth areas should also be amended as necessary. The source of the information should be encoded using the complex attribute **information** (see clause 2.4.6). However, Producing Authorities should carefully consider the time needed to update ENC depth information and the complexity of changes to the topology that may be required.
 - The encoding of amended **Sounding**, **Depth Area** and associated features could be inappropriate for promulgating this navigationally significant information within acceptable time scales. In this case a **Caution Area** (see clause 16.11) is the preferred option. In such cases, only the most significant amendments to depth information should be provided using the complex attribute **information**. This method should also be used if the depth values and/or the exact positions are unknown, or if the producer only has information relating to a limited number of depth values.

Annex AA - Notice Marks (main European inland waterway system)

category of notice mark	Meaning	Code	Picture	Area of Impact	Features / (Attributes)
1	no entry (general sign)	A.1		no area, when at a bridge, otherwise bank to bank	Restricted Area (restriction = 7)
2	sections closed to use, no entry except for non-motorized small craft	A.1.1			Restricted Area (restriction = 8)
3	no overtaking	A.2		bank to bank	Restricted Area (restriction = 28)
4	no overtaking of convoys by convoys	A.3		bank to bank	Restricted Area (restriction = 29)
5	no passing or overtaking	A.4		bank to bank	Restricted Area (restriction = 30)
6	no berthing (i.e. no anchoring or making fast to the bank) on the side of the waterway on which the sign is placed	A.5		bank to fairway	Restricted Area (restriction = 1, 31)
7	no berthing on the stretch of water whose breadth, measured from the sign, is shown in metres on the sign	A.5.1		bank to indicated distance	Restricted Area (restriction = 1, 31)
8	no anchoring or trailing of anchors, cables or chains on the side of the waterway on which the sign is placed	A.6		bank to fairway or bank to bank if the sign is placed on both banks	Restricted Area (restriction = 1)
9	no making fast to the bank on the side of the waterway on which the sign is placed	A.7		bank to fairway	Restricted Area (restriction = 31) (restriction = 38 if applicable)
10	no turning	A.8		bank to bank	Restricted Area (restriction = 35)
11	do not create wash likely to cause damage	A.9		bank to bank or bank to middle of fairway depending on the size of the waterway	Restricted Area (restriction = 13)
12	no passing on left side (in openings of bridges or weirs)	A.10			
13	no passing on right side (in openings of bridges or weirs)	A.10			
14	motorized craft prohibited	A.12		bank to bank	Restricted Area (restriction = 8, information text = motorized craft prohibited)
15	sports or pleasure craft prohibited	A.13			
16	water skiing prohibited	A.14			

category of notice mark	Meaning	Code	Picture	Area of Impact	Features / (Attributes)
17	sailing vessels prohibited	A.15			
18	all craft other than motorized vessels or sailing craft prohibited	A.16			
19	use of sailboards prohibited	A.17			
20	water bikes prohibited	A.20			
21	end of zone authorized for high speed navigation of small sport and pleasure craft	A.18			
22	no launching or beaching of vessels	A.19			
23	proceed in left direction	B.1			
24	proceed in right direction	B.1			
25	move to the side of the fairway on your port side	B.2a			
26	move to the side of the fairway on your starboard side	B.2b			
27	keep the side of the fairway on your port side	B.3a			
28	keep the side of the fairway on your starboard side	B.3b			
29	cross fairway to port	B.4a			
30	cross fairway to starboard	B.4b			
31	stop as prescribed in the Regulations	B.5			
32	do not exceed the speed indicated (in km/h)	B.6		bank to bank	Restricted Area (restriction = 27, information text = 12 km/h)
33	give a sound signal	B.7			
34	keep a particularly sharp lookout	B.8			
35	do not enter the main waterway until certain that this will not oblige vessels proceeding on it to change their course or speed	B.9a			
36	do not cross the main waterway until certain that this will not oblige vessels proceeding on it to change their course or speed	B.9b			

category of notice mark	Meaning	Code	Picture	Area of Impact	Features / (Attributes)
37	obligation to enter into a radiotelephone link on the channel as indicated on the board	B.11		bank to bank	Communication Area (category of communication, communication channel = 11, status = 9)
38	depth of water limited	C.1			Restricted Area (restriction = 36, information text = 2.20 m)
39	headroom limited	C.2			
40	width of passage or channel limited	C.3			Restricted Area (restriction = 37, information text = 45 m)
41	there are restrictions on navigation: see the information plate below the sign	C.4			
42	the channel lies at a distance from the left bank; the figure shown on the sign indicates the distance in metres, measured from the sign, to which vessels should keep	C.5		bank to distance	Restricted Area (restriction = 7)
43	the channel lies at a distance from the right bank; the figure shown on the sign indicates the distance in metres, measured from the sign, to which vessels should keep	C.5		bank to distance	Restricted Area (restriction = 7)
44	recommended channel in both directions (at bridges)	D.1a			
45	recommended channel only in the direction indicated (passage in the opposite direction prohibited) (at bridges)	D.1b			
46	you are recommended to keep on right side (in openings of bridges and weirs)	D.2			
47	you are recommended to keep on left side (in openings of bridges and weirs)	D.2			
48	you are recommended to proceed in the left direction	D.3			
49	you are recommended to proceed in the right direction	D.3			
50	entry permitted (general sign)	E.1			
51	overhead cable crossing	E.2			
52	weir	E.3			

category of notice mark	Meaning	Code	Picture	Area of Impact	Features / (Attributes)
53	ferry-boat not moving independently	E.4a			
54	ferry-boat moving independently	E.4b			
55	berthing (i.e. anchoring or making fast to the bank) permitted on the side of the waterway on which the sign is placed	E.5			Anchorage Area, Anchor Berth, Berth
56	berthing permitted on the stretch of water of the breadth measured from, and shown on the board in metres	E.5.1			Anchorage Area, Anchor Berth, Berth
57	berthing permitted on the stretch of water bounded by the two distances measured from, and shown on the board in metres	E.5.2			Anchorage Area, Anchor Berth, Berth
58	maximum number of vessels permitted to berth abreast on the side of the waterway on which the sign is placed	E.5.3			Anchorage Area, Anchor Berth, Berth
59	berthing area reserved for pushing-navigation vessels that are not required to carry blue lights or blue cones on the side of the waterway on which the sign is placed	E.5.4			Anchorage Area, Anchor Berth, Berth (category of anchorage = 10/category of berth = 4, class of dangerous cargo = 4)
60	berthing area reserved for pushing-navigation vessels that are required to carry one blue light or one blue cone on the side of the waterway on which the sign is placed	E.5.5			Anchorage Area, Anchor Berth, Berth (category of anchorage = 10/category of berth = 4, class of dangerous cargo = 1)
61	berthing area reserved for pushing-navigation vessels that are required to carry two blue lights or two blue cones on the side of the waterway on which the sign is placed	E.5.6			Anchorage Area, Anchor Berth, Berth (category of anchorage = 10/category of berth = 4, class of dangerous cargo = 2)
62	berthing area reserved for pushing-navigation vessels that are required to carry three blue lights or three blue cones on the side of the waterway on which the sign is placed	E.5.7			Anchorage Area, Anchor Berth, Berth (category of anchorage = 10/category of berth = 4, class of dangerous cargo = 3)

category of notice mark	Meaning	Code	Picture	Area of Impact	Features / (Attributes)
63	berthing area reserved for vessels other than pushing-navigation vessels that are not required to carry blue lights or blue cones on the side of the waterway on which the sign is placed	E.5.8			Anchorage Area, Anchor Berth, Berth (category of anchorage = 11/category of berth = 5, class of dangerous cargo = 4)
64	berthing area reserved for vessels other than pushing-navigation vessels that are required to carry one blue light or one blue cone on the side of the waterway on which the sign is placed	E.5.9			Anchorage Area, Anchor Berth, Berth (category of anchorage = 11/category of berth = 5, class of dangerous cargo = 1)
65	berthing area reserved for vessels other than pushing-navigation vessels that are required to carry two blue lights or two blue cones on the side of the waterway on which the sign is placed	E.5.10			Anchorage Area, Anchor Berth, Berth (category of anchorage = 11/category of berth = 5, class of dangerous cargo = 2)
66	berthing area reserved for vessels other than pushing-navigation vessels that are required to carry three blue lights or three blue cones on the side of the waterway on which the sign is placed	E.5.11			Anchorage Area, Anchor Berth, Berth (category of anchorage = 11/category of berth = 5, class of dangerous cargo = 3)
67	berthing area reserved for all vessels that are not required to carry blue lights or blue cones on the side of the waterway on which the sign is placed	E.5.12			Anchorage Area, Anchor Berth, Berth (class of dangerous cargo = 4)
68	berthing area reserved for all vessels that are required to carry one blue light or one blue cone on the side of the waterway on which the sign is placed	E.5.13			Anchorage Area, Anchor Berth, Berth (class of dangerous cargo = 1)
69	berthing area reserved for all vessels that are required to carry two blue lights or two blue cones on the side of the waterway on which the sign is placed	E.5.14			Anchorage Area, Anchor Berth, Berth (class of dangerous cargo = 2)
70	berthing area reserved for all vessels that are required to carry three blue lights or three blue cones on the side of the waterway on which the sign is placed	E.5.15			Anchorage Area, Anchor Berth, Berth (class of dangerous cargo = 3)

category of notice mark	Meaning	Code	Picture	Area of Impact	Features / (Attributes)
71	anchoring or trailing of anchors, cables or chains permitted on the side of the waterway on which the sign is placed	E.6			Anchorage Area, Anchor Berth
72	making fast to the bank permitted on the side of the waterway on which the sign is placed	E.7			Berth
73	berthing area reserved for loading and unloading vehicles	E.7.1			Berth
74	turning area	E.8			Turning Basin
75	crossing with secondary waterway ahead	E.9a			
76	secondary waterway ahead on the right	E.9b			
77	secondary waterway ahead on the left	E.9c			
78	secondary waterway ahead (main waterway right)	E.9d			
79	secondary waterway ahead (main waterway left)	E.9e			
80	secondary waterway left (main waterway right)	E.9f			
81	secondary waterway right (main waterway left)	E.9g			
82	secondary waterway ahead and left (main waterway right)	E.9h			
83	secondary waterway ahead and right (main waterway left)	E.9i			
84	crossing with main waterway ahead	E.10a			
85	junction with main waterway ahead	E.10b			
86	junction with main waterway ahead and right	E.10c			
87	junction with main waterway ahead and left	E.10d			
88	junction with main waterway ahead and right (secondary waterway left)	E.10e			
89	junction with main waterway ahead and left (secondary waterway right)	E.10.f			
90	end of prohibition or obligation applying to traffic in one direction only, or end of a restriction	E.11			

category of notice mark	Meaning	Code	Picture	Area of Impact	Features / (Attributes)
91	drinking-water supply	E.13			
92	telephone	E.14			
93	motorized vessels permitted	E.15		bank to fairway or bank to bank depending on local situation	Caution Area (information) text = motorized vessels permitted)
94	sport and pleasure craft permitted	E.16		bank to fairway or bank to bank depending on local situation	Caution Area (information) text = sport and pleasure craft permitted)
95	water skiing permitted	E.17		bank to fairway or bank to bank depending on local situation	Caution Area (information) text = water skiing permitted)
96	sailing vessels permitted	E.18		bank to fairway or bank to bank depending on local situation	Caution Area (information) text = sailing vessels permitted)
97	craft other than motorized vessels or sailing craft permitted	E.19		bank to fairway or bank to bank depending on local situation	Caution Area (information) text = craft other than motorized vessels or sailing craft permitted)
98	use of sailboards permitted	E.20		bank to fairway or bank to bank depending on local situation	Caution Area (information) text = use of sailboards permitted)
99	possibility of obtaining nautical information by radio-telephone on the channel indicated	E.23		bank to bank	Communication Area (category of communication, communication channel = 11, status = 3)
100	water bikes permitted	E.24		bank to fairway	Caution Area (information) text = water bikes permitted)
101	zone authorized for high speed navigation of small sport and pleasure craft	E.21		bank to fairway or bank to bank depending on local situation	Caution Area (information) text = zone authorized for high speed navigation of small sport and pleasure craft)
102	launching or beaching of small craft permitted	E.22		bank to fairway	Caution Area (information) text = launching or beaching of small craft permitted)
110	wreck pontoon, passage allowed on side showing red-white sign				

category of notice mark	Meaning	Code	Picture	Area of Impact	Features / (Attributes)
111	wreck pontoon, passage allowed on both signs				
117	electrical power supply point	E.25			
118	winter harbor	E.26			
119	maximum number of vessels permitted to berth in winter harbor	E.26.1			
120	winter shelter	E.27			
121	maximum number of vessels permitted to berth in winter shelter maximum number of vessels permitted to berth abreast maximum number of rows of vessels which are berthed abreast	E.27.1			
122	use of spuds permitted	E.6.1			
123	Obligation to use onshore power supply point	B.12			

Annex AB - Notice Marks (Russian Inland Waterway Regulations)

category of notice mark	Meaning	Code	Picture	Area of Impact	Features / (Attributes)
5	no passing or overtaking	1.3		bank to bank	Restricted Area (restriction = 30)
8	no anchoring or trailing of anchors, cables or chains	1.1		bank to fairway	Restricted Area (restriction = 1)
11	do not create wash	1.4		bank to bank	Restricted Area (restriction = 13)
39	headroom limited	2.4			
74	turning area	3.2			
112	no passing or overtaking of convoys	1.2		bank to bank	Restricted Area (restriction = 30, information text = no passing or overtaking of convoys)
113	small crafts prohibited	1.5		bank to bank	Restricted Area (information text = small crafts prohibited)
114	Attention! (Keep caution)	2.1			
115	fairway crossing	2.2			
116	shipping inspection point	3.3			

Annex AC - Notice Marks (Brazilian National Inland Waterway)

category of notice mark	Meaning	Picture	Bank	Area of Impact	Function	Features / (Attributes)
1	no entry (general sign)			no area, when at a bridge, otherwise bank to bank	Regulation mark (function of notice mark = 2)	Restricted Area (restriction = 7)
8	no anchoring or trailing of anchors, cables or chains		left (bank of the waterway = 1)	upstream (direction of impact = 1) or downstream (direction of impact = 2)	Prohibition mark (function of notice mark = 1)	Restricted Area (restriction = 1)
8	no anchoring or trailing of anchors, cables or chains		right (bank of the waterway = 2)	upstream (direction of impact = 1) or downstream (direction of impact = 2)	Prohibition mark (function of notice mark = 1)	Restricted Area (restriction = 1)
39	headroom limited		left (bank of the waterway = 1)	upstream (direction of impact = 1) or downstream (direction of impact = 2)	Restriction mark (function of notice mark = 3)	
39	headroom limited		right (bank of the waterway = 2)	upstream (direction of impact = 1) or downstream (direction of impact = 2)	Restriction mark (function of notice mark = 3)	
44	recommended channel in both directions (at bridges)					
45	recommended channel only in the direction indicated (passage in the opposite direction prohibited) (at bridges)					
82	secondary waterway ahead on the left, main waterway on the right		left (bank of the waterway = 1)	upstream (direction of impact = 1) or downstream (direction of impact = 2)	Information mark (function of notice mark = 5)	

category of notice mark	Meaning	Picture	Bank	Area of Impact	Function	Features / (Attributes)
82	secondary waterway ahead on the left, main waterway on the right		right (bank of the waterway = 2)	upstream (direction of impact = 1) or downstream (direction of impact = 2)	Information mark (function of notice mark = 5)	
83	secondary waterway ahead on the right, main waterway on the left		left (bank of the waterway = 1)	upstream (direction of impact = 1) or downstream (direction of impact = 2)	Information mark (function of notice mark = 5)	
83	secondary waterway ahead on the right, main waterway on the left		right (bank of the waterway = 2)	upstream (direction of impact = 1) or downstream (direction of impact = 2)	Information mark (function of notice mark = 5)	
103	proceed close to the margin on your portside		left (bank of the waterway = 1)	downstream (direction of impact = 2)	Regulation mark (function of notice mark = 2)	Brazilian national inland waterway regulations (marks navigatoional - system of = 13)
103	proceed close to the margin on your portside		right (bank of the waterway = 2)	upstream (direction of impact = 1)	Regulation mark (function of notice mark = 2)	Brazilian national inland waterway regulations (marks navigatoional - system of = 13)
104	proceed close to the margin on your starboard side		left (bank of the waterway = 1)	upstream (direction of impact = 1)	Regulation mark (function of notice mark = 2)	Brazilian national inland waterway regulations (marks navigatoional - system of = 13)
104	proceed close to the margin on your starboard side		right (bank of the waterway = 2)	downstream (direction of impact = 2)	Regulation mark (function of notice mark = 2)	Brazilian national inland waterway regulations (marks navigatoional - system of = 13)
105	proceed in the middle of the river		left (bank of the waterway = 1)	upstream (direction of impact = 1) or downstream (direction of impact = 2)	Regulation mark (function of notice mark = 2)	Brazilian national inland waterway regulations (marks navigatoional - system of = 13)

category of notice mark	Meaning	Picture	Bank	Area of Impact	Function	Features / (Attributes)
105	proceed in the middle of the river		right (bank of the waterway = 2)	upstream (direction of impact = 1) or downstream (direction of impact = 2)	Regulation mark (function of notice mark = 2)	Brazilian national inland waterway regulations (marks navigational - system of = 13)
106	cross river to port		left (bank of the waterway = 1)	upstream (direction of impact = 1)	Regulation mark (function of notice mark = 2)	Brazilian national inland waterway regulations (marks navigational - system of = 13)
106	cross river to port		right (bank of the waterway = 2)	downstream (direction of impact = 2)	Regulation mark (function of notice mark = 2)	Brazilian national inland waterway regulations (marks navigational - system of = 13)
107	cross river to starboard		left (bank of the waterway = 1)	downstream (direction of impact = 2)	Regulation mark (function of notice mark = 2)	Brazilian national inland waterway regulations (marks navigational - system of = 13)
107	cross river to starboard		right (bank of the waterway = 2)	upstream (direction of impact = 1)	Regulation mark (function of notice mark = 2)	Brazilian national inland waterway regulations (marks navigational - system of = 13)
103	proceed close to the margin on your portside		left (bank of the waterway = 1)	downstream (direction of impact = 2)	Regulation mark (function of notice mark = 2)	Paraguay-Parana waterway - Brazilian complementary aids (marks navigational - system of = 15)
103	proceed close to the margin on your portside		right (bank of the waterway = 2)	upstream (direction of impact = 1)	Regulation mark (function of notice mark = 2)	Paraguay-Parana waterway - Brazilian complementary aids (marks navigational - system of = 15)

category of notice mark	Meaning	Picture	Bank	Area of Impact	Function	Features / (Attributes)
104	proceed close to the margin on your starboard side		left (bank of the waterway = 1)	upstream (direction of impact = 1)	Regulation mark (function of notice mark = 2)	Paraguay-Parana waterway - Brazilian complementary aids (marks navigational - system of = 15)
104	proceed close to the margin on your starboard side		right (bank of the waterway = 2)	downstream (direction of impact = 2)	Regulation mark (function of notice mark = 2)	Paraguay-Parana waterway - Brazilian complementary aids (marks navigational - system of = 15)
105	proceed in the middle of the river		left (bank of the waterway = 1)	upstream (direction of impact = 1) or downstream (direction of impact = 2)	Regulation mark (function of notice mark = 2)	Paraguay-Parana waterway - Brazilian complementary aids (marks navigational - system of = 15)
105	proceed in the middle of the river		right (bank of the waterway = 2)	upstream (direction of impact = 1) or downstream (direction of impact = 2)	Regulation mark (function of notice mark = 2)	Paraguay-Parana waterway - Brazilian complementary aids (marks navigational - system of = 15)
106	cross river to port		left (bank of the waterway = 1)	upstream (direction of impact = 1)	Regulation mark (function of notice mark = 2)	Paraguay-Parana waterway - Brazilian complementary aids (marks navigational - system of = 15)
106	cross river to port		right (bank of the waterway = 2)	downstream (direction of impact = 2)	Regulation mark (function of notice mark = 2)	Paraguay-Parana waterway - Brazilian complementary aids (marks navigational - system of = 15)
107	cross river to starboard		left (bank of the waterway = 1)	downstream (direction of impact = 2)	Regulation mark (function of notice mark = 2)	Paraguay-Parana waterway - Brazilian complementary aids (marks navigational - system of = 15)

category of notice mark	Meaning	Picture	Bank	Area of Impact	Function	Features / (Attributes)
107	cross river to starboard		right (bank of the waterway = 2)	upstream (direction of impact = 1)	Regulation mark (function of notice mark = 2)	Paraguay-Parana waterway - Brazilian complementary aids (marks navigatoional - system of = 15)
108	traffic between margins		left (bank of the waterway = 1)	upstream (direction of impact = 1) or downstream (direction of impact = 2)	Information mark (function of notice mark = 5)	Caution Area
108	traffic between margins		right (bank of the waterway = 2)	upstream (direction of impact = 1) or downstream (direction of impact = 2)	Information mark (function of notice mark = 5)	Caution Area
109	reduce speed		left (bank of the waterway = 1)	upstream (direction of impact = 1) or downstream (direction of impact = 2)	Regulation mark (function of notice mark = 2)	Restricted Area (restriction = 27)
109	reduce speed		right (bank of the waterway = 2)	upstream (direction of impact = 1) or downstream (direction of impact = 2)	Regulation mark (function of notice mark = 2)	Restricted Area (restriction = 27)
124	right pillar in passage for Tiete-Parana Waterway (at bridges)					
125	left pillar in passage for Tiete-Parana Waterway (at bridges)					
126	best transit point (at bridges)					
127	Mandatory Stopping Point for Tiete-Parana Waterway					