**S-124**



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**Navigational Warnings Product Specification**

**Candidate for Edition 2.0.0 – March 2025**

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**Document History**

Changes to this Product Specification are coordinated by the IHO World-Wide Navigational Warning Service Sub-Committee (WWNWS-SC). New editions will be made available via the IHO web site. Maintenance of the Product Specification shall conform to IHO Technical Resolution 2/2007 (as amended).

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| --- | --- | --- | --- |
| **Version Number** | **Date** | **Author** | **Purpose** |
| 0.0.1 | May 2018 | EM | Initial draft |
| 0.0.1 | June 2018 | EM | Edits following SHOM comments |
| 0.0.2 | October 2018 | EM | Implementing decisions of WWNWS10 |
| 0.0.3 | March 2019 | EM | Edits following CG review comments |
| 0.0.4 | June 2019 | EM | Aligning the draft to S-100 Ed 4.0.0 |
| 0.0.5 | October 2022 | EM, VM, YLF, EG, JB | Alignment with S-100 Ed 5.0.0 and implementing latest data model |
| 1.0.0 | May 2023 | EM | Application of review comments |
| 1.5.0 | June 2024 | EM | Update to S-100 Ed 5.2.0, implement guidance from S-100WG8 discussions on datasets, and application of Ed.1.0.0 comments.  Harmonized with S-101 DCEG Ed 1.4.0 |
| 2.0.0 | October 2024 | EM | Adjudicated comments made to 1.5.0 |
| 2.0.0 | November 2024 | JW | Formatting to current IHO template |
| 2.0.0 | December 2024 | EM, ES, JP, SO | Updating FC, XSD, DCEG and PS following comments during WWNWS-Sc endorsement stage. |
| 2.0.0 | March 2024 | IHO CL xx/2025 | First operational Edition of S-124. |

**Summary of Substantive Changes from Edition 2.0.0**

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| **Change Summary** | **Clauses Affected** |
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# Overview

## Introduction

This document has been produced by the IHO World-Wide Navigational Warning Service

Sub-Committee (WWNWS-SC). The purpose of this document is to respond to requests to produce a data product that can be used in a Navigational Warning Information Overlay (NWIO) within an Electronic Chart Display and Information System (ECDIS). It is based on the IHO S-100 framework specification and the ISO 19100 series of standards. It is a vector product specification that is primarily intended for encoding the nature and extent of Navigational Warnings, for navigational purposes.

S-124 is based on the guidelines set forth for navigational warnings in the Joint IHO/IMO/WMO Manual on Maritime Safety Information (MSI), IHO Publication S-53. It should be noted that although S-53 covers the spectrum of MSI, S-124 focuses only on Navigational Warnings.

S-124 has been designed to enable creation of Navigational Warning datasets for traditional Radio Broadcast, NAVTEX and within the international enhanced group call (EGC) service. This design feature aims to permit a greater sense of backwards compatibility, allowing production systems to share the same information in multiple channels for the greatest possible dispersion of critical navigational safety information.

S-124 Navigational Warnings are intended to be used in an overlay to nautical charts within a navigation system.

## Scope

This document describes an S-100 compliant Product Specification for Navigational Warnings, which will form an overlay layer for an S-100 based marine navigation system. It specifies the content, structure, and metadata needed for creating a fully compliant S-124 product and for its portrayal within an S-100 system. This Product Specification includes content model, encoding, Feature Catalogue, Portrayal Catalogue, and metadata.

## References

### Normative

IALA G1143 *Unique Identifiers for Maritime Resources*, Edition 3.0. International Association of Marine Aids to Navigation and Lighthouse Authorities, June 2021.

ISO 639-2/T *Codes for the representation of names of languages – Part 2: Alpha-3 code*

ISO 3166-1 *Codes for the Representation of Names of Countries and their Subdivisions – Part 1: Country Codes*

M-3 *Resolutions of the International Hydrographic Organization*, IHO Publication M-3, 2nd Edition, 2010 (updated April 2022).

S-53 *Joint IHO/IMO/WMO Manual on Maritime Safety Information (MSI)*, January 2016 Edition

S-62 *List of Data Producer Codes* (online), URL: <https://registry.iho.int/producercode/list2.do>

S-97 *IHO Guidelines for Creating S-100 Product Specifications*, Edition 1.1.0, June 2020.

S-98 *Data Product Interoperability in S-100 Navigation Systems*

S-100 *IHO Universal Hydrographic Data Model*, Edition 5.2.0, June 2024

S-157:124 *Validation Checks for S-124*

### Informative

ISO 8601:2004 *Data Elements and Interchange Formats – Information Interchange – Representation of Dates and Times*

ISO 19103:2005 *Geographic Information – Conceptual Schema Language*

ISO 19103-2:2005 *Geographic Information – Conceptual Schema Language – Part 2*

ISO 19115-1 *Geographic information – Metadata – Part 1 - Fundamentals*. As amended by Amendment 01 (2018)

ISO/TS 19115-3 *Geographic information - Metadata - XML schema implementation for fundamental concepts*

ISO 19117:2012 *Geographic Information – Portrayal*

ISO 19131:2008 *Geographic Information – Data Product Specifications*

ISO 19157:2013 *Geographic Information – Data Quality*

S-101 *IHO Electronic Navigational Chart Product Specification*, Edition 1.1.0 (under development).

IEC 63173-2:2022 *Maritime navigation and radiocommunication equipment and systems - Data interfaces - Part 2: Secure communication between ship and shore (SECOM)*

## Terms, Definitions and Abbreviations

### 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.

### Terms and Definitions

The S-100 framework is based on the ISO 19100 series of geographic standards. The terms and definitions provided here are used to standardize the nomenclature found within that framework, whenever possible. They are taken from the references cited in clause 2.1. Modifications have been made when necessary.

**Application**

Manipulation and processing of data in support of user requirements (ISO 19101)

**Data Product**

A **dataset** or **dataset series** that conforms to a **data product specification**

**Data Product Specification**

Detailed description of a **dataset** or **dataset series** together with additional information that will enable it to be created, supplied to and used by another party

NOTE: A data product specification provides a description of the universe of discourse and a specification for mapping the universe of discourse to a dataset. It may be used for production, sales, end-use or other purpose.

**Dataset**

Identifiable collection of data (ISO 19115)

NOTE: A dataset may be a smaller grouping of data which, though limited by some constraint such as spatial extent or feature type, is located physically within a larger dataset. Theoretically, a dataset may be as small as a single feature or feature attribute contained within a larger dataset. A hardcopy map or chart may be considered a dataset.

**Dataset Series**

Collection of **datasets** sharing the same product specification (ISO 19115)

Distinction: series

**Domain**

Well-defined set (ISO/TS 19103)

NOTE: Well-defined means that the definition is both necessary and sufficient, as everything that satisfies the definition is in the set and everything that does not satisfy the definition is necessarily outside the set.

**Exchange Set**

Datasets may be grouped into exchange sets. Each exchange set consists of one or more datasets with an associated XML metadata file and a single Exchange Catalogue XML file containing metadata. It may also include one or more support files.

**Feature**

Abstraction of real world phenomena (ISO 19101)

NOTE: A feature may occur as a type or an instance. Feature type or feature instance shall be used when only one is meant.

**Feature Association**

Relationship that links instances of one **feature** type with instances of the same or a different **feature** type (ISO19110)

NOTE 1; A feature association may occur as a type or an instance. Feature association type or feature association instance is used when only one is meant.

NOTE 2: Feature associations include aggregation of features.

**Feature Attribute**

Characteristic of a **feature** (ISO 19101)

NOTE 1: A feature attribute may occur as a type or an instance. Feature attribute type or feature attribute instance is used when only one is meant.

NOTE 2: A feature attribute type has a name, a data type and a domain associated to it. A feature attribute for a feature instance has an attribute value taken from the domain.

**Geographic Data**

Data with implicit or explicit reference to a location relative to the Earth (ISO 19109)

NOTE: Geographic information is also used as a term for information concerning phenomena implicitly or explicitly associated with a location relative to the Earth.

**In-Force Bulletin**

A list of serial numbers of those NAVAREA, Sub-area or coastal warnings in force issued and broadcast by the NAVAREA Coordinator, Sub-area Coordinator or National Coordinator

NOTE: S-124 also includes local warnings in-force bulletin.

**Metadata**

Data about data (ISO 19115)

**Model**

Abstraction of some aspects of reality (ISO 19109)

**Navigational Warning**

Navigational warning means a message containing urgent information relevant to safe navigation broadcast to ships in accordance with the provisions of the International Convention for the Safety of Life at Sea, 1974, as amended

**Portrayal**

Presentation of information to humans (ISO 19117)

**Quality**

Totality of characteristics of a product that bear on its ability to satisfy stated and implied needs (ISO 19101)

**Series**

A series is a numbered sequence of navigational warnings of the same type (NAVAREA, sub-area, coastal or local) issued by an authority acting as official production agency. Rem: S-53 identifies NAVAREA coordinator, sub-Area coordinator, national coordinator for coastal warnings. As local warnings are out of the scope of S-53, the term of “coordinators” is not used for local warnings

### Abbreviations

This product specification adopts the following convention for symbols and abbreviated terms:

DCEG Data Classification and Encoding Guide

ECDIS Electronic Chart Display and Information Systems

ENC Electronic Navigational Chart

GMDSS Global Maritime Distress and Safety System

GML Geography Markup Language

IHO International Hydrographic Organization

ISO International Organization for Standardization

MRN Maritime Resource Name

NAVWARN Navigational Warning

NWIO Navigational Warning Information Overlay

UML Unified Modelling Language

URI Uniformed Resource Identifier

URL Uniform Resource Locator

URN Uniform Resource Name

WWNWS World-Wide Navigational Warning Service, the internationally and nationally coordinated service for the promulgation of navigational warnings, part of the maritime safety information service of the GMDSS

WWNWS-SC IHO World-Wide Navigational Warning Service Sub-Committee

www World Wide Web

WGS World Geodetic System

XML Extensible Markup Language

XSLT eXtensible Stylesheet Language Transformations

## General data product description

NOTE: This information contains general information about the data product.

**Title:** Navigational Warnings Product Specification.

**Abstract:** This specification is developed for creating datasets containing navigational warning information primarily targeting use in ECDIS. Navigational warning means a message containing urgent information relevant to safe navigation broadcast to ships in accordance with the provisions of the International Convention for the Safety of Life at Sea,1974, as amended (S-53, 2.2.1.23). Use of Navigational Warning datasets in other systems than ECDIS is permitted.

**Content:** A dataset conforming to this specification will contain all relevant information of an individual Navigational Warning. Datasets of a series are delivered by means of an exchange set. Additionally, there will be relevant metadata about data quality, production authority, and publication date.

**Spatial Extent:**

**Description:** Global coverage of maritime areas.

**East Bounding Longitude:** 180°

**West Bounding Longitude:** -180°

**North Bounding Latitude:** 90°

**South Bounding Latitude:** -90°

**Purpose:** The purpose of this document is to respond to requests to produce a data product that can be used as a Navigational Warning Information Overlay (NWIO) within an Electronic Chart Display and Information System (ECDIS). It is based on the IHO S-100 framework specification and the ISO 19100 series of standards. It is a vector product specification that is primarily intended for encoding the extent and nature of Navigational Warnings, for navigational purposes.

## Data Product Specification metadata

This information uniquely identifies this Product Specification and provides information about its creation and maintenance. For further information on dataset metadata see the metadata clause.

**Title:** Navigational Warnings Product Specification

**S-100 Version**: 5.2.0

**S-124 Version**: 2.0.0

**Date**: March 2025

**Language**: English

**Classification**: Unclassified

**Contact**: International Hydrographic Bureau,   
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**URL**: [www.iho.int](http://www.iho.int)

**Identifier**: S-124

**Maintenance**: Changes to the Product Specification S-124 are coordinated by the IHO World Wide Navigational Warning Service Sub-Committee, and are made available via the IHO web site. Maintenance of the Product Specification must conform to IHO Resolution 2/2007, as amended.

**Compliancy Category:** category4

## IHO Product Specification maintenance

### Introduction

Changes to S-124 will be released by the IHO as a New Edition, revision, or clarification.

### New Edition

*New Editions* of S-124 introduce significant changes. *New Editions* enable new concepts, such as the ability to support new functions or applications, or the introduction of new constructs or data types. *New Editions* are likely to have a significant impact on either existing users or future users of S-124. All cumulative *revisions* and *clarifications* must be included with the release of approved New Editions.

### Revision

*Revisions* are defined as substantive semantic changes to S-124. Typically, *revisions* will change S-124 to correct factual errors; or introduce necessary changes that have become evident as a result of practical experience or changing circumstances. A *revision* must not be classified as a clarification. *Revisions* could have an impact on either existing users or future users of S-124. All cumulative *clarifications* must be included with the release of approved revisions.

Changes in a *revision* are minor and ensure backward compatibility with the previous versions within the same Edition. Newer revisions, for example, introduce new features and attributes. Within the same Edition, a dataset of one version could always be processed with a later version of the Feature and Portrayal Catalogues.

In most cases a new Feature Catalogue or Portrayal Catalogue will result in a *revision* of S-124.

### Clarification

*Clarifications* are defined as non-substantive changes to S-124. Typically, *clarifications*: remove ambiguity; correct grammatical and spelling errors; amend or update cross references; and insert improved graphics. A *clarification* must not cause any substantive semantic change to S-124.

Changes in a *clarification* are minor and ensure backward compatibility with the previous versions.

### Version Numbers

The associated version control numbering to identify changes (n) to this specification must be as follows:

New Editions denoted as **n**.0.0

Revisions denoted as n.**n**.0

Clarifications denoted as n.n.**n**

# Specification Scope

This product specification defines only one general scope which applies to all its sections.

**Scope ID:** Global

**Level:** 006 - series

**Level name:** NAVWARN Dataset

# Data product identification

**Title:** Navigational Warning

**Alternate Title:** NAVWARN

**Abstract:** Navigational Warning dataset is a vector dataset containing the extent and nature of an individual Navigational Warning, for navigational purposes. Information on the duration of the information may be included.

**Geographic Description:** Areas specific to marine navigation

**Spatial Resolution:** Information is compiled as scale independent information using the required accuracy

**Purpose:** Navigational Warning datasets are produced for navigational purposes within an ECDIS, and to allow the producer or issuer to exchange NAVWARN information with navigators.

**Language:** English must be used for international services, while local language may be provided in addition to English. National services may provide either local language only, or a combination of local language and English.

**Classification:** 1) Unclassified

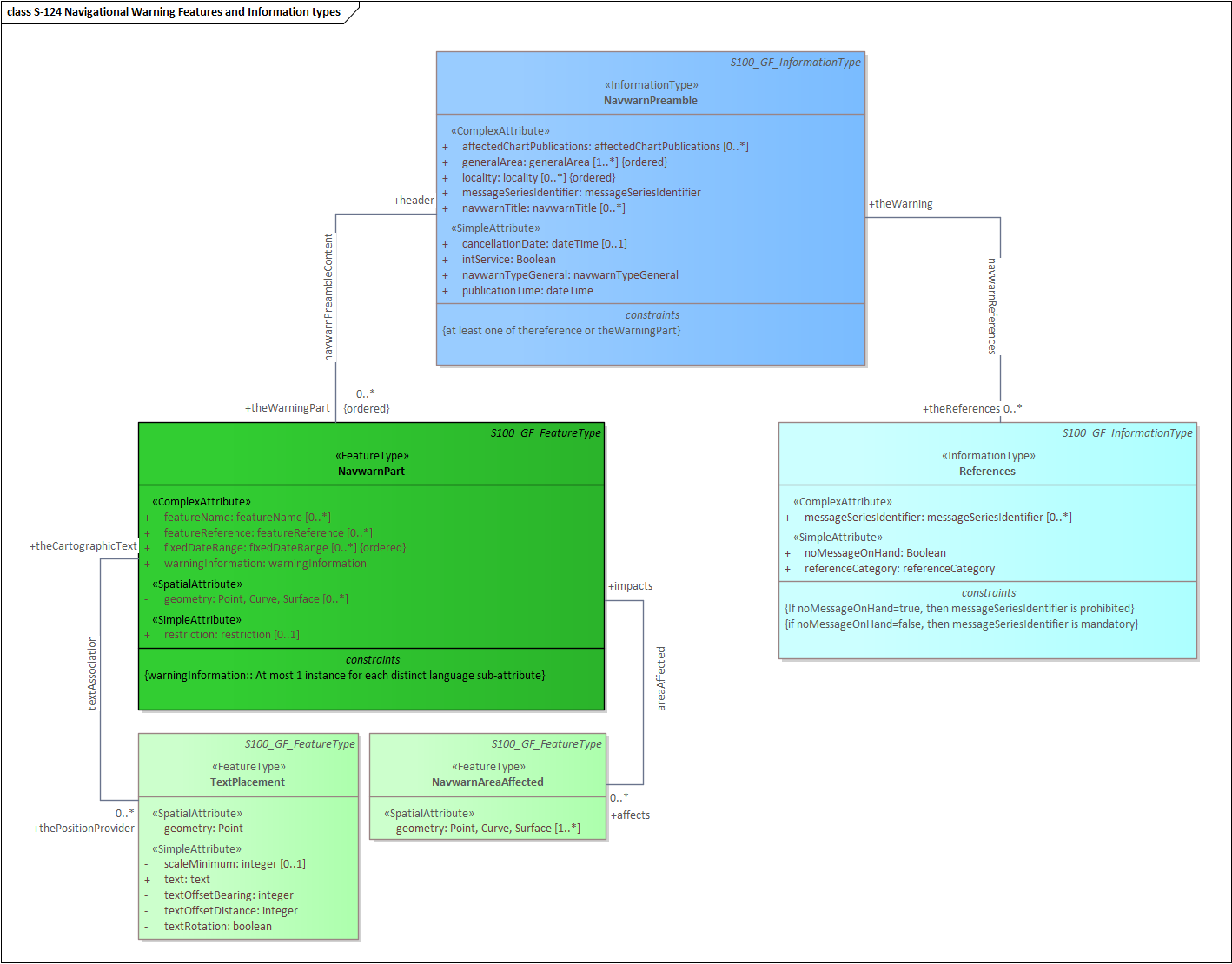
**Spatial Representation Type:** Vector

**Point of Contact:** Producing Agency

**Use Limitation:** Should be used with an ENC

# Data Content and Structure

The S-124 application schema is simple and aims to remain compatible with S-53 style navigational warnings for the purpose of backwards compatibility of the information. A general principle of one navigational warning per dataset applies throughout. The application schema is presented as a UML data model. The data model consists of five classes whereof three feature types and two information types. These may also be referred to as feature classes and information classes. Abstract classes are not discussed since they are included to show the to link with the S-100 General Feature Model. The feature types are **NavwarnPart, NavwarnAreaAffected,** and **TextPlacement**, and these are derived from the *S100\_GF\_FeatureType* meta class. **NavwarnPart** holds the what and where part of a navigational warning, **NavwarnAreaAffected** is an optional construct and used to mark areas impacted by a navigational warning outside the immediate vicinity where the navigational warning itself is placed, while **TextPlacement** is an optional construct for placing text labels on the display that may aid in explaining the content of the navigational warning. Depending on the purpose of navigational warning, all feature types are optional for a compliant dataset. The information types consist of **NavwarnPreamble** and **References**, and both are derived from the *S100\_GF\_InformationType* meta class. **NavwarnPreamble** is a mandatory part of every navigational warning as it provides the general overview information about the specific navigational warning. Therefore, every compliant S-124 dataset must contain only one **NavwarnPreamble**. The **References** class serves several potential functions. It is used to reference earlier navigational warnings for cancellation or for creating in-force bulletins. It is also used to declare when no navigational warnings are present in a series. Figure 4-1 below gives an overview of these five main classes and the relationships between them.



**Figure 4‑1 – Feature and Information Types in S-124 data model**

## Relationships in the data model

**NavwarnPreamble** can have two types of relationships; **navwarnPreambleContent** and **navwarnReferences**. The **navwarnPreambleContent** is an optional relationship with one or more **NavwarnPart** feature classes which hold any location specific information of a navigational warning, as well as any further details on the nature of a warning. The **navwarnReferences** relationship is an optional relationship with one or more **References** information classes which hold any reference to previously issued navigational warnings and describes the nature of that reference. The nature of the references currently supported are described in the **referenceCategory** enumerated list.

Each **NavwarnPart** can geographically locate a piece of warning information (also see 4.4). For example, a Navigational Warning about a newly discovered wreck marked with a new wreck buoy should have two instances of **NavwarnPart**: one for the wreck and one for the buoy which marks the new wreck. Each instance of **NavwarnPart** can be associated with zero to many instances of **NavwarnAreaAffected** and **TextPlacement** classes through the **AreaAffected** and **textAssociation** associations, respectively. The instances are linked indirectly through their relationships to a common **NavwarnPreamble** and will constitute a single NAVWARN**.**

## Use of geometry attributes

The **NavwarnPart** class can have three types of spatial geometries: point, curve, or surface, as well as no geometry (See 5.6). The **geometry** spatial attribute holds the location of the issue being warned about. In some cases, there are impacts from an issue that occurs outside the immediate vicinity of the warning itself and such impacts can be annotated by using the **NavwarnAreaAffected** class and referencing it back to the originating **NavwarnPart**. This method can be used to enhance the user’s awareness of an affected area following some incident. For example, should a light be out of service, the location of the light should be marked using a **NavwarnPart** instance, while the area where the light can be expected to be visible may be marked with an area demarked by a **NavwarnAreaAffected** instance. The **NavwarnAreaAffected** class can thus draw the user’s attention to the outage, even though it may be outside the immediate area of focus.

It is permissible to have navigational warnings without geometry that contain general statements without a geographic component, however it is encouraged to use the **NavwarnAreaAffected** feature class for such navigational warnings to give them a general area of applicability. Moreover, these should be assigned to the publisher's area of responsibility. This is necessary to enable the user system to place the navigational warning on the display, since the only alternative when geometry is not provided is to list the navigational warning in a list with all others that may increase the difficulty for the user to accurately understand the impact of the information.

## Full S-124 data model



**Figure 4‑2 – The Full S-124 Data Model**

Figure 4-2 shows the full S-124 data model, but note that the codelist **navwarnTypeDetails** have been collapsed. This is to facilitate reading of the model since this list is of significant length. The full content of the **navwarnTypeDetails** codelist can be viewed in the feature catalogue.

### Enumerations and Codelists



**Figure 4‑3 – Enumerations**

****

**Figure 4‑4 – Codelists**

Figures 4-3 and 4-4 show all S-124 enumerations and codelists. Enumeration and code list values are represented in the data by their numerical value and label. The codelist for navigational warning type details has been collapsed due to its significant length and may be reviewed in its entirety in the feature catalogue (see Appendix B). The codelists ISO 639-2 (language code), ISO 3166-1 (country code), S62 (IHO data producer code) and EPSG (horizontal datum code) have been collapsed due to their length and may be reviewed in their entirety in the relevant reference documents. The ISO 639-2, ISO 3166-1, S62 and EPSG codelists are not directly implemented in the data model, and the relevant attributes are of text data type, but expect a data value that conforms with the relevant standard.

Both **navwarnTypeGeneral** and **navwarnTypeDetails** are open enumeration codelists, meaning that additional values can be defined by producers if needed. It is recommended that as new needs are identified, requests for amendments to S-124 be made, and thus standardize the hazard types as far as possible. The predefined values are represented in the data by a numerical value.

Example: The navwarnTypeDetails codelist does not contain the value Space Weather, and producer need this value and intend to make an S-124 change request submission to get this type added to a future version of the standard. Meanwhile, the producer can make use of the open codelist capability and configure the production system to display Space Weather as an allowable value, but in the output the GML encoding is;

<S124:warningInformation>

<S124:navwarnTypeDetails code="other">other: Space Weather</S124:navwarnTypeDetails>

</S124:warningInformation>

### Soft List of an informative mapping between general and detailed warning types

ANNEX H - Soft List is a comprehensive and informative list that groups all values in the **navwarnTypeDetails** codelist with values in the **navwarnTypeGeneral** codelist. The Soft list helps implementers of production systems to design interfaces that allow a logical filtering of values. This filtering is intended to enable a simpler production process and remove illogical choices from the process. In addition to the logical combination of **navwarnTypeGenera**l and **navwarnTypeDetails**, the complex attribute **warningInformation** has an information attribute that provides amplifying text. This text furnishes the associated NAVWARN with sufficient information regarding the situation that is being published.

### Complex attributes



**Figure 4‑5 – Complex Attributes**

Figure 4-5 shows all the complex attributes used in the S-124 data model. Note that the instances where ISO 3166-1 and ISO 639-2 are used, the data type is text that must conform to the formatting of the code format given in the ISO standards.

All complex attributes with the **language** sub attribute have only one language per instance. Meaning that if the producer wishes to enhance the service with more than one language, there must be as many instances of these complex attributes as there are languages in the data.

Any instance of time, either in text or in attributes, such as **timeOfDayEnd** and **timeOfDayStart** in the complex attribute **fixedDateRange,** must be populated with UTC time values.

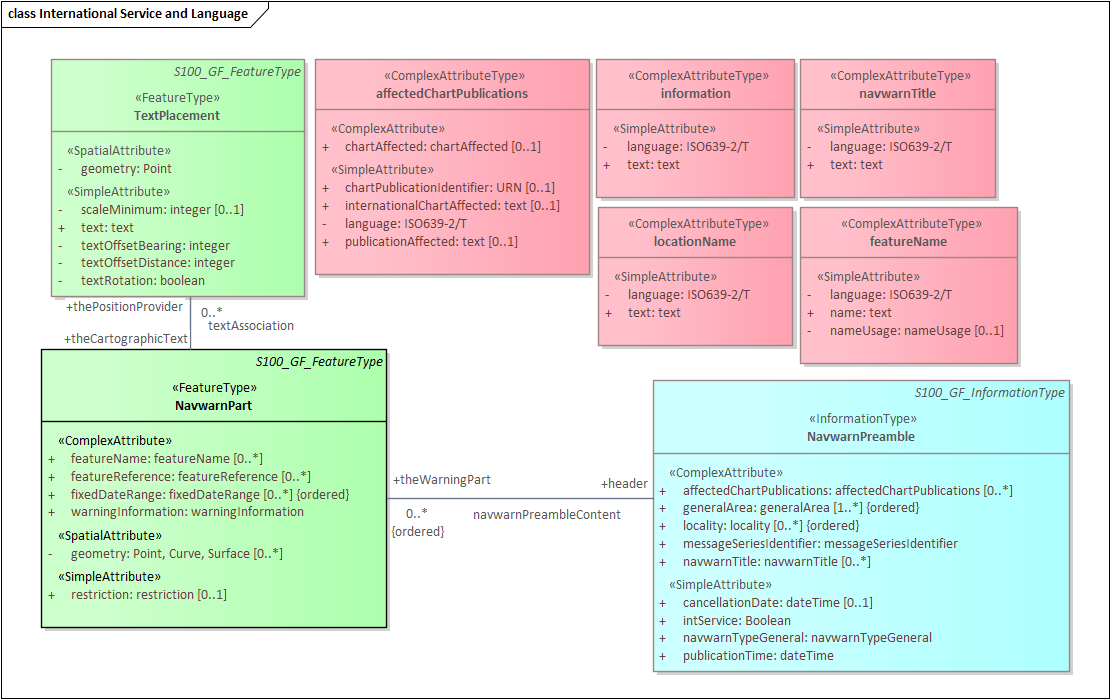
The attribute interoperabilityIdentifier of the messageSeriesIdentifer complex attribute should follow the MRN concept (see paragraph 8.7). The agencyResponsibleForProduction attribute of the same must be populated with a alpha code value that corresponds with one of the valid values in the S-62 list of S-100 codes found in the Producer Code Register of the IHO GI Registry.

The **affectedChartPublications** complex attribute is intended for capturing any references to charts or publications whose content is concerned by the navigational warning. Any instance is intended to hold only one reference, and when more than one chart and/or publication must be referenced within a navigational warning, additional instances of the attribute must be included. The **chartAffected** complex attribute has been added to give a common standard structure to any chart number references.

The **featureReference** complex attribute has been added to give producers a structured reference to any features that may be concerned by the navigational warning, or parts thereof. Wherever possible, references should use the **interoperabilityIdentifier** attribute to capture the MRN of any affected features which may be utilized by user system functions to create intuitive references in the navigational data to help the user to better understand what is impacted by a navigational warning. Alternatively, an attribute for the AtoN Number has been provided. Other types of references are not supported at this time, and can be included in the **warningInformation** complex attribute if considered relevant to the warning message.

The **featureName** complex attribute has been added to the **NavwarnPart** feature class to enable a logical reference to a named object by adding the object name for which the navigational warning, or part thereof, refers to. If it is required to include more than one name of an item, this is done by using as many instances of **featureName** as required. The **nameUsage** sub-attribute can be used to indicate if the name is the default name for display or an alternative name, such as when two different languages are present in the NAVWARN. Other usages are also possible. Caution should be taken when employing this function as it may cause screen clutter.

## Language and text



**Figure 4‑6 – Model elements related to international service and language**

The mandatory **NavwarnPreamble** class has the mandatory attribute **intService**. This attribute is a Boolean that indicates if the navigational warning message is part of an international service or a national service. When **intService** is true, then it is mandatory to provide all text in the attributes of text data type using the English language, while any other languages can be added where appropriate. Any user system should provide a function to give the user the option to see the information in any language that is supported by the navigational warning dataset.

When a NAVWARN service is provided in languages other than English, a language pack for that language should be created using the methods described in S-100 Part 18 and distributed through the appropriate channels. The language pack will include appropriate translation for the feature catalogue elements needed to enhance the user interface with text in the selected language. The language pack must therefore be present in the user system to work as intended. It may be advantageous to also include support for the language pack in the S-124 production system to ensure best possible harmonization between data and the language pack.

The **TextPlacement** class is a cartographic feature used specifically to place text cartographically and is always point geometry. The **text** attribute holds the string which is to be placed, while the **textOffsetBearing** and **textOffsetDistance** attributes give the bearing and distance (in millimetres in the ECDIS display) used to position the text relative to the source **NavwarnPart** feature.

The Text Placement feature may provide functionality such that, as an ECDIS screen rotates from its optimum position in “north up” display mode (for example, if display is set to “course up”) text can remain readable, or clear other important charted information.

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. The value encoded in the attribute must be selected from the following list;

**Table 4-1 – Scale minimum values**

|  |
| --- |
| 19999999 |
| 9999999 |
| 4999999 |
| 3499999 |
| 1499999 |
| 999999 |
| 699999 |
| 499999 |
| 349999 |
| 259999 |
| 179999 |
| 119999 |
| 89999 |
| 59999 |
| 44999 |
| 29999 |
| 21999 |
| 17999 |
| 11999 |
| 7999 |
| 3999 |
| 2999 |
| 1999 |
| 999 |

## Classification of a navigational warning



**Figure 4‑7 – Model elements used in classifying a NAVWARN**

All S-124 based navigational warnings datasets must be classified using the **navwarnTypeGeneral** attribute of **NavwarnPreamble**. This is done to enable user systems to present the user with filtering options. In the event that none of the pre defined values in the **navwarnTypeGeneral** codelist is appropriate, special classifications can be added using the encoding “other: [something]”.

When it is required to locate NAVWARN information using one or more **NavwarnPart** instances, these must be classified using the **warningInformation** attribute. The **warningInformation** attribute must include at least one instance of its sub-attributes. The **navwarnTypeDetails** attribute should be given priority and be used to classify the warning. If amplifying remarks are required, these should be added to the **information** attribute.

Using the predefined values in **navwarnTypeGeneral** and **navwarnTypeDetails** should be given priority over specially defined classification values, since the predefined values take less data because they are represented in the data by a numerical value as opposed to text strings.

# Feature Catalogue

## Introduction

The Feature Catalogue describes the feature types, information types, attributes, attribute values, associations and roles which may be used in the product. The S-124 Feature Catalogue is available in an XML document which conforms to the S-100 XML Feature Catalogue Schema and can be downloaded from the IHO Geospatial Information Registry website (https://registry.iho.int/). Simple attributes used in this specification are listed in Table 5-1 – Simple feature attributes.

## Feature Types

Feature types contain descriptive attributes that characterize real-world entities. The word ‘feature’ may be used in one of two senses – 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.

### Geographic

Geographic (geo) feature types carry the descriptive characteristics of a real-world entity (a location or place on the surface of the Earth). In the context of hydrographic products, this includes the adjacent regions from the sea floor to elevations of landforms and structures above the Earth’s surface.

### Cartographic

Cartographic features contain information about the cartographic representation (including text) of real-world entities.

### Information Types

Information types define identifiable pieces of information in a dataset that can be shared using information associations. They have attributes but have no geometry.

## Feature and information relationships

A feature relationship links instances of one feature type with instances of the same or a different feature type.

An information relationship links instances of feature types or information types to instances of information types.

## Attributes

S-124 defines attributes as either simple or complex.

### Simple Attributes

S-124 uses ten types of simple attributes; they are listed in the following table:

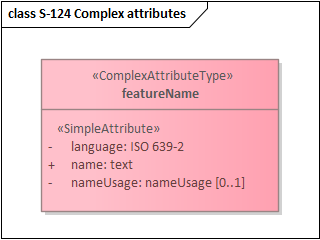
**Table 5-1 – Simple feature attributes.**

|  |  |
| --- | --- |
| **Type** | **Definition** |
| Boolean | A value representing binary logic. The value can be either true or false. |
| Enumeration | One of a list of predefined values |
| Integer (int) | An integer number |
| Text or CharacterString | An arbitrary-length sequence of characters including accents and special characters from a repertoire of one of the adopted character sets |
| Date | A date gives values for year, month and day according to the Gregorian Calendar. Character encoding of a date is a string which shall follow the calendar date format (complete representation, basic format) for date specified by ISO 8601.  EXAMPLE 19980918 (YYYYMMDD)  In XML formats, the XML Schema standard type should be used instead of the ISO 8601 basic representation (which is not a standard type in XML).  EXAMPLE: 1998-09-18  NOTE: Since S-124 uses XML formats for both datasets and metadata, the XML encoding must be used. |
| Time | A 24-hour time, it may contain a time zone.  In XML formats the XML Schema standard type should be used instead of the ISO 8601 basic representation (which is not a standard type in XML).  EXAMPLES:  18:30:59Z (time in UTC);  18:30:59+01:00 (local time with given offset);  18:30:59 (local time without an offset to UTC).  NOTE: Since S-124 uses XML formats for both datasets and metadata, the XML encoding must be used. |
| Date and Time | A DateTime is a combination of a date and a time type. Character encoding of a DateTime shall follow ISO 8601 (see above). The “T” is a separator indicating that time-of-day follows.  EXAMPLE: 19850412T101530 (YYYMMDDThhmmss)  In XML formats, the XML Schema standard type should be used instead of the ISO 8601 basic representation (which is not a standard type in XML).  EXAMPLES: 1985-04-12T10:15:30; 1985-04-12T10:15:30+01:00;  1985-04-12T10:15:30Z  NOTE: Since S-124 uses XML formats for both datasets and metadata, the XML encoding must be used. |
| Codelist | A type of flexible enumeration. A code list type is a list of literals which may be extended only in conformance with specified rules. |
| Truncated date | An S100\_TruncatedDate allows a date or partial date to be given. At least one of the year/month/day components must be present. Since S-124 uses XML formats for both dataset and metadata, the XML encoding (XML type **gMonthDay**) of truncated dates must be used (i.e., the ISO 8601 basic format is not used in S-124).  Components:  YYYY Year integer between 0000 and 9999  MM Month integer between 01 – 12 (inclusive)  DD Day integer between 01 and 28, 29, 30, or 31 (inclusive), consistent with year and month values if these are specified  **gMonthDay** is a Gregorian date that recurs, specifically a day of the year such as the third of May. Arbitrary recurring dates are not supported by this datatype. The value space of **gMonthDay** is the set of calendar dates, as defined in § 3 of ISO 8601. Specifically, it is a set of one-day long, annually periodic instances.  This type can be used to encode recurring instants (see S-100 Part 3, clause 3-8). The appropriate XML Schema type should be used. The “g” indicates a Gregorian date is utilized.  EXAMPLE::  --12-17 representing 17 December of any year (conforming to the XML type **gMonthDay**)  S-100 Part 10b provides further details about encoding in GML datasets. |
| URN | A persistent, location-independent, resource identifier that follows the  syntax and semantics for URNs specified in RFC 2141.  EXAMPLE: urn:mrn:iho:hydro:js:AnchorageArea01 |

Note: the use of URN in S-124 must utilize the schema of the Maritime Resource Name (MRN) concept.

### Complex Attributes

Complex attributes are aggregations of other attributes that are either simple or complex. The aggregation is defined by means of attribute bindings.



**Figure 5‑1 – featureName - a complex attribute**

## Units of Measure

There is no use of a specific unit of measure in the S-124 data model. However, the content of text attributes that describe the nature of navigational warnings should make use of the following units of measure where appropriate:

* Orientation is given in decimal degrees.
* Radio frequency is given in hertz.
* Uncertainty is given in metres.
* Horizontal distance is given in either metres (m) or kilometres (km) or nautical miles (NM), as indicated by the designation.
* Depths are given in metres.
* Heights are given in metres.

## Geometric Representation

Geometric representation is the digital description of the spatial component of an object as described in S-100 Part 7 and ISO 19107. This product specification uses three types of geometries: **point, curve and surface.**

Spatial uncertainties can be encoded using the complex attribute **spatialAccuracy**. For values expressed quantitatively the **horizontalPositionAccuracy** sub-complex attribute must be used, or qualitatively expressed values are captured using the **qualityOfHorizontalMeasurement** enumerated list. This modelling of spatial uncertainties align with that of S-101 ENCs.



**Figure 5‑2 - Spatial Quality**

# Coordinate Reference System (CRS)

## Introduction

A NAVWARN dataset must define one geodetic CRS and may define vertical CRS information for depths and elevations textually when appropriate for the warning content.

## Reference systems used in S-124

The horizontal CRS must be EPSG:4326 (WGS84). The full reference to EPSG: 4326 can be found at https://epsg.org/home.html.

**Horizontal Coordinate Reference System:** EPSG:4326 (WGS84)

**Projection:** None

**Vertical Coordinate Reference System:** Vertical CRS for depths and elevations may be specified in the sub attribute **information** of the **warningInformation** complex attribute using amplifying text.

**Temporal reference system:** Gregorian calendar

**Coordinate Reference System registry:** [EPSG Geodetic Parameter Registry](http://www.epsg-registry.org/)

**Date type (according to ISO 19115):** 002- publication

**Responsible party:** International Organisation of Oil and Gas Producers (IOGP)

**URL:** https://epsg.org/crs\_4326/WGS-84.html

NOTE: To match WGS84 specification, coordinate order in S-124 GML files must be latitude followed by longitude.

### Vertical Coordinate Reference System

Although all coordinates in a dataset must refer to the same horizontal CRS, different Vertical Datums can be used for the depth or heights described in Navigational Warning datasets. The S-124 data must use meter for heights when included. The amplifying text in the sub attribute **information** of the **warningInformation** complex attribute may include information about heights or depths. When this is the case, the vertical datum used in the measurement shall be made clear from the text.

### Temporal reference system

Time is measured by reference to Calendar dates and Clock time in accordance with ISO 19108:2002 Temporal Schema clause 5.4.4. All instances of time in datasets conforming to S-124 must be expressed in UTC. Time and date values must conform to the formatting requirements of the time and date datatypes. Where it is necessary to add temporal information in an attribute of text data type in a NAVAREA, sub-area or coastal warning, the information must always be expressed using UTC. Local warnings may also include temporal information in local time. Following the format of S-53; the accepted format for a Date Time Group (DTG) in the text of a message is as follows: DDHHMM UTC MoMoMo YY; for example 231642 UTC JUN 14.

## Projection

Navigational Warning data products are un-projected.

# Data Capture and Classification

S-124 products are the result of the official production agency process. S-124 products must be based on data sources deemed reliable by the production agency. The Data Classification and Encoding Guide (DCEG) describes how data describing a Navigational Warning should be captured using the types defined in the S-124 Feature Catalogue, and is found in Appendix A. General principles for Navigational Warnings according to WWNWS, such as how to administer a NAVAREA, what constitute a sub area warning and coastal warning are found in S-53 - Joint IHO/IMO/WMO Manual on Maritime Safety Information (MSI). Local warnings are outside of scope of S-53, and will be defined in national or local documentation.

# Datasets

## Introduction

A Navigational Warning is communicated via a dataset. A dataset is a grouping of features, attributes, geometry and metadata which comprises a specific coverage. Some products include a coverage feature to describe where content of a dataset is. This method is not utilized by S-124 datasets, primarily since the majority of S-124 datasets contains only one point, see clause 8.9 for more details.

### Data encoding

The principal encoding is the Open Geospatial Consortium (OGC), Geography Markup Language (GML) format as profiled by the S-100 GML schema in Part 10b of S-100.

The XML Schema for the S-124 GML application schema is available at the GI Registry (http://registry.iho.int). Feature instances must validate against the schema and conform to all other requirements specified in this data product specification including all constraints not captured in the XML Schema document.

### Types of datasets

There are five types of S-124 datasets, and a dataset must contain only one Navigational Warning or In-force Bulletin.

**Table 8-1 – Dataset types**

|  |  |
| --- | --- |
| **Dataset type** | **Explanations** |
| New dataset | Dataset with a new warning. The dataset is valid until a cancellation dataset is issued.  A *new dataset* will include only one **NavwarnPreamble** instance and may include one or more **References** with **noMessageOnHand** equal false, and may include one or more **NavwarnPart**. If one or more **NavwarnPart** are present, the dataset may include one or more **TextPlacement**. |
| New dataset self-cancelling | Dataset with a new warning that includes a cancellation date.  A *new dataset that self-cancels* has the same content rules as a *new dataset*, with the addition of the **NavwarnPreamble** attribute **cancellationDate** being populated with a value. |
| New dataset with cancellation | Dataset used to cancel previous warning. May include updated information related to the warning that is being cancelled.  A *new dataset with cancellation* has the same content rules as a *new dataset*, with the addition of having at least one **References** instance with **noMessageOnHand** equal false, and with **referenceCategory** set to *1 (warning cancellation),* and one or more instances of **messageSeriesIdentifier**,each corresponding to a previous NAVWARN to be cancelled. |
| New dataset with cancellation self-cancelling | Dataset used to cancel previous warning. May include updated information related to the warning that is being cancelled. Includes a cancellation date.  A *new dataset with cancellation self-cancelling* has the same content rules as *New dataset with cancellation*, with the addition of the **NavwarnPreamble** attribute **cancellationDate** being populated with a value. |
| In-force bulletin | Dataset that references all in-force navigational warnings, and always cancels the previous in-force bulletin.  An *in-force bulletin* dataset will include only one **NavwarnPreamble** instance and must include one **References** instance with **referenceCategory** set to 3 (in-force). If **noMessageOnHand** equals true, then no other content is permissible. If **noMessageOnHand** equals false then one or more **messageSeriesIdentifier** instance(s) must be included.  Any reference to messages still in force but not being broadcast must be captured in a **NavwarnPart**.  The dataset must not contain any geomtry nor NavwarnAreaAffected nor **TextPlacement** instances. |

### In-Force Bulletin

All datasets must be considered in-force and valid until a new dataset with cancellation information is issued or where cancellation date is present in a dataset, that date is not passed. Due to the regional nature of navigational warnings services, it is possible that users enter and exit NAVWARN services, or miss broadcasts of NAVWARNs and that such stop and go movement of a ship will cause a user to miss out on cancellation information. To act as a fail safe for the status of information issued in a NAVWARN service, the In-Force Bulletin has been created.

An In-Force Bulletin dataset can be issued at regular intervals, such as the weekly minimum prescribed by S-53, to inform users of the active NAVWARNs in a service. For completeness and to support machine readability, the In-Force Bulletin should include a reference to itself as active.

In-Force Bulletin datasets should be accompanied by metadata that contain the Dataset Discovery Metadata (DDM) for the dataset itself (see Table 8-1) packaged in an exchange set. The ECDIS will load the dataset before processing it as the In-Force Bulletin for the series.

The in-force bulletin must not be used by a producer to cancel valid datasets, see clause 9.3.

### No message on hand

When there are no active warnings in a series, the regularly issued in-force bulletin dataset must be encoded with an **NavwarnPreamble** associated with only one instance of **References**. The **References** instance must have **referenceCategory** set to 3 (in-force), and **noMessageOnHand** set to true.

## Encoding of latitude and longitude

Values of latitude and longitude can be accurate up to 7 decimal places. Coordinate values should be coded as decimal numbers with 7 or fewer digits after the decimal. The normative encoding is in degrees, with an accuracy of 10-7 degrees; that is, up to 7 digits after the decimal point.

## Numeric attribute encoding

Integer attribute values must not contain leading zeros.

Floating point attributes must not contain leading zeros. Values in the interval (-1, 1) may use a single zero before the decimal point.

Floating point attribute values must not contain non-significant trailing zeros exceeding the attribute’s precision as specified in the Feature Catalogue.

## Text attribute values

Character strings must be encoded using the character set defined in ISO 10646-1, in Unicode Transformation Format-8 (UTF-8).

## Mandatory Attribute Values

There are four reasons why attribute values may be considered mandatory:

* They determine whether a feature is to be displayed,
* Certain features make no logical sense without specific attributes,
* Some attributes are necessary to determine which symbol is to be displayed,
* Some attributes are required for safety of navigation.

All mandatory attributes are identified in the Feature Catalogue and summarised in Appendix A – Data Classification and Encoding Guide.

## Unknown attribute values

Mandatory attributes in an S-124 dataset are not permitted to contain a nil value. All mandatory attributes must contain meaningful data.

## Object identifiers

Navigational warnings are identified by the **messageSeriesIdentifer** complex attribute. Within this complex attribute the **interoperabilitIdentifier** simple attribute is used to capture the navigational warning identifier as an MRN identifier.

The **featureReference** complex attribute also contains the **interoperabilitIdentifier** simple attribute, which is where references to other objects in other products can be included when useful. These references must be of MRN type.

Guidance on use of MRN identifiers can be found in IALA G1143. This guidance should be considered informative and should be superseded with future IHO guidance.

## Geometry

Navigational warning features are encoded as vector entities which conform to S-100 geometry configuration level 3a (see S-100 Part 7, clause 7-4.3).

S-124 further constrains Level 3a with the following clarifications:

* Coincident linear geometry must be avoided when there is a dependency between features.
* The interpolation of GM\_CurveSegment should be either loxodromic, circularArc3Points, or circularArcCenterPointWithRadius, depending on the use case.
* Linear geometry is defined by curves which are made of curve segments. Each curve segment contains the geographic coordinates as control points and defines an interpolation method between them. Coordinate density can have a significant impact on file size and system performance and should be as low as possible.
* For a scale-less product, the producer should keep in mind the expected scale range for typical use and the density of coordinates needed to suit the needs of the product.

The use of coordinates is restricted to two dimensions (DirectPosition is restricted to two coordinates) in S-124 datasets.

## Data coverage

A common feature of S-100 based datasets is a data coverage meta feature class. Navigational Warnings, however, more resemble messages and contain only the essential information to communicate urgent safety information. Therefore a distinct meta feature class to mark the data coverage is not included. The discovery metadata associated with each S-124 dataset fulfils this function and describes the area in which the information in the associated dataset is located.

### Data extent

A datasets must not cross the 180° meridian of longitude.

## Data overlap

S-124 datasets may overlap other S-124 datasets.

## Data quality

Datasets conforming to S-124 should always be created with the best available source information. Due to the urgency of the information, datasets may be based on incomplete or unconfirmed information and mariners will need to take this into account when deciding what reliance to place on the information contained therein. It is often not possible to determine quantifiable values to measures of data quality. Generally the quality of information can be made evident from the navigational warning amplifying text by the use of qualitative words such as ‘approximate’, ‘reported’, ‘in the vicinity of’ and ‘about’.

EXAMPLE: Dredging operations will be taking place in the vicinity of Goldwood Sawmill (49°12.47’N / 123°04.83’W), in the Mitchell Slough starting on Saturday, February 2 to Monday, February 5.

Geometry in datasets should by default have a **qualityOfPosition** set to 4 (approximate). Other values should only be chosen when source material justify such values.

Example: a light is reported as unlit, due to the access to the national AtoN database, the position of the light can accurately be determined. The **qualityOfPosition** of the geometry of the NAVWARN is set to 10 (precisely known).

### Validation checks

S-124 products must be validated by appropriate means. Datasets and exchange sets that conform to this specification must be validated to have no critical errors with checks defined in the relevant version of IHO S-158.

## Use of datasets

S-124 datasets are intended to be used as an overlay over an electronic navigational chart. This means that S-124 datasets must be created with content sufficient to communicate the intended information to a user when the user views the datasets over the chart display. This includes sufficient accuracy of location information, as well as sufficient levels of details on the navigational safety information contained in the S-124 dataset.

## Scale in S-124 datasets

Navigational Warning data must be compiled in the best applicable scale. The use of the data itself is scale independent. That means that the data can be used at any scale.

# Data Delivery

## Data Product Delivery Information

This data product specification defines GML as the primary format in which S-124 data products are delivered. See S-100 Part 10b and the S-124 GML schema documentation for a complete description of the data records, fields and subfields defined in the encoding.

## Dataset loading

### Use of S-124 in ECDIS

In ECDIS all valid S-124 datasets must always be loaded. Validity is indicated by the **cancellationDate** attribute in the **NavwarnPreamble** class, and any point in time prior to this time value the dataset is valid. If the **cancellationDate** attribute is empty this means the dataset is valid until cancelled by a new dataset. Validity is terminated if a cancellation dataset is issued before the **cancellationDate** of a dataset.

Validity is also indicated by the NAVWARN being present in the latest in-force bulletin. Any dataset prior to and not found in the latest in-force bulletin must be considered not valid.

### In-force bulletin

If the in-force bulletin contains one or more NAVWARNs that are not present in the system, an indication should be given.

## Dataset cancellation

S-124 Datasets may be cancelled in one of four ways:

* Populating the **cancellationDate** attribute in the dataset and the **temporalExtent** in the metadata (see 12.2.2), and that date has passed. The user system should mark the dataset cancelled; or
* Sending a cancellation dataset which contains only one instance of a References information type with the **referenceType** attribute set to 1 (cancellation), and the **messageReference** with the identifier(s) of the dataset(s) to be cancelled, as well as including a fileless cancellation (see S-100 Part b17, clause 17-4.4.1) of the dataset being cancelled; or
* Sending a new dataset with updated information and one or more References information type with the **referenceType** attribute set to 1 (cancellation), and the **messageReference** with the identifier(s) of the previous dataset(s) to be cancelled, as well as including a fileless cancellation (see S-100 Part 17, clause 17-4.4.1) of the dataset being cancelled; or
* Marking as cancelled any S-124 dataset in a user system that is prior to and not present on the most recent in-force bulletin.

NOTE: The in-force list should not actively be used as a means to cancel S-124 datasets, its role in dataset cancellation should only be as a failsafe in the event that a service interruption has caused the user system to miss one or more datasets that cancels earlier information.

## Updating datasets

S-124 does not support delta changes to issued S-124 datasets. In order to update the information provided in S-124 datasets, a new dataset which cancel the previous information (see clause 8.1.2) and contain updated information must be issued and applied to the user system.

## Exchange Set

Datasets which conform to this product specification must be delivered as a component of an Exchange Set which complies with Part 17 of S-100. The S-100 Exchange Set structure is set up to facilitate machine reading of the datasets, and this is in part done with metadata. This metadata is comprised of metadata about the overall Exchange Catalogue; metadata about each of the datasets contained in the Catalogue; and metadata about the support files that make up the package. Not all metadata is mandatory in all Exchange Sets and details about this is given below.

An S-124 Exchange Set should consist of one or more S-124 datasets with an associated XML metadata file and a single Exchange Catalogue XML file containing metadata. It may also include one or more support files. The S-124 Exchange Set structure is the same as that described in S-100.

NOTE: S-124 does not specify the usage of ISO Metadata File.

The rules governing the presence and roles of the Exchange Set components are given below.

* 1. Every Exchange Set must contain an Exchange Catalogue.
  2. Dataset discovery metadata (**S100\_DatasetDiscoveryMetadata**) must be provided in the Exchange Catalogue for each S-124 dataset in the Exchange Set.
  3. Catalogue metadata (**S100\_CatalogueDiscoveryMetadata**) must be provided in the Exchange Catalogue for any feature and portrayal catalogues included in the Exchange Set.
     1. S-124 allows Exchange Sets to include only support files that are language packs (**S100\_SupportFile**).

NOTE: The inclusion of language packs in Exchange Sets is optional.

* 1. Language packs are described in S-100 Part 18 and provide translations of feature catalogues.
  2. A signature file for the Exchange Catalogue must also be included in the Exchange Set (**S100\_CatalogueSignature**).

It is important to align the Exchange Set creation workflow with the data integrity and security provisions outlined in S-100 Part 15. S-100 Part 15 defines the requirements and process for creation and verification of digital signature values and production of compressed/encrypted datasets.

To maximize the usability of the navigational warning information contained in S-124 Exchange Sets, encryption and compression should be avoided.

## Dataset size

S-124 datasets must not exceed 50KB. The limit was chosen following tests that revealed that all examples tested can fit within the limit. S-124 datasets should be kept small so as to aid in reducing any costs with transmission of the information.

## Dataset naming convention

All dataset files will have unique world-wide file identifiers. The file identifier of the dataset should not be used to describe the physical content of the file. The dataset file metadata that accompanies the file will inform the user of the name and purpose of the file (new, new with cancellation, new self-cancelling, new with cancellation and self-cancelling, and in-force bulletin).

The dataset files must be named according to the specifications given in S-100 Part 17, clause 17-4.3.

## Exchange Set structure

The Exchange Catalogue acts as the table of contents for the Exchange Set. The catalogue file of the Exchange Set must be named CATALOG.XML. No other file in the Exchange Set may be named CATALOG.XML. The content of the Exchange Catalogue file is described in Section 12.

The structure of an S-124 exchange set must be according to the structure found in S-100 Clause 17-4.2.

## Service delivery

### Technical service

S-124 does not specify the technical means by which services distributing S-124 must utilize. The mechanism utilized should be specified in an e-navigation technical service conforming to IALA G1128 and which elaborates on how users can discover and access the NAVWARN service.

### SECOM

A draft specification for how to set up an e-navigation technical service compatible with the IEC 63173-2:2022 framework is available at [Maritime Resource Registry Portal (digital-maritime-consultancy.github.io)](https://digital-maritime-consultancy.github.io/mrr-portal/) using the MRN identifier "urn:mrn:iho:techsvc:spec:navwarn".

### Push broadcast systems

This version of S-124 does not consider the implications of using push broadcast systems (for example NAVDAT and VDES) in detail, but it is assumed that it is usable by any files based system.

# Data Maintenance

## Introduction

S-124 datasets in a series are issued as per any situation arise requiring safety critical information be made known to mariners. Datasets of the series are maintained as needed and must be done according to clause 9.2. When related to the same event, series dataset updates will be made by new datasets which cancel any preceding datasets.

Data Producers must use applicable sources to maintain and update data and may provide a brief description of the sources that were used to produce the dataset if this information is relevant. It is up to the Data Producer to determine what an appropriate source when creating Navigational Warning datasets is. S-53 chapter 3 – ‘NAVAREA/SUB-AREA/NATIONAL COORDINATORS' RESOURCES AND RESPONSIBILITIES’ gives further information on how to manage information streams when creating S-124 Navigational Warnings within the WWNWS framework. Local warnings may be subject to national or regional guidelines.

The specific production process is up to each Data Producer. The Data Producer should sufficiently document their individual production process for quality management purposes.

## Production process datasets

Data Producers should follow their established production processes for maintaining and updating datasets. Data is produced against the DCEG and checked against the appropriate set of validation rules in S-158.

## Information updates

The purpose of issue of the dataset is indicated in the “purpose” field of the dataset discovery metadata. In order to cancel a dataset or update the information given by a dataset, one of the methods described in clause 9.3 is followed.

## Support file updates

The purpose of issue is indicated in the “revisionStatus” attribute of the support file discovery metadata. Support files carrying the “deletion” flag in metadata must be removed from the system

## Feature and portrayal catalogues

For each New Edition (**n**.0.0, see clause 1.7.5) of the S-124 Product Specification a new feature and portrayal catalogue will be released. A revision (n.**n**.0) may also include a new feature and/or portrayal catalogue. The system must be able to manage datasets and their catalogues that are created on different versions of the S-124 Product Specification.

# Portrayal

Navigational Warnings portrayal is provided by a portrayal catalogue that includes a symbol set and symbol instructions for the various feature and attribute combinations. ANNEX D - Portrayal Catalogue contains the portrayal catalogue using the XSLT concept from S-100 Part 9.

## End User system portrayal requirements

### Portrayal requirements of the Graphical User Interface

A dedicated interface is required to provide users with interaction with NAVWARN messages. This interface should be linked to an individual user so that the risk of missing information during watch handover is reduced. This interface shall, at a minimum, provide functionality for;

1. The user shall be able to tag individual messages according to the filtering criteria in clause 11.1.2.
2. Capability for a call listing of all NAVWARN messages in the system and sorting these according to: received date and time, issue date and time, warning type, producer and series, must be provided. Additionally, a means to list according to user classification should be provided.
3. Provide an indication when a new NAVWARN message is received into the System Database until it has been displayed or 24 hours have passed. This indication may be suppressed if the NAVWARN message does not meet filtering criteria set by the mariner (see 11.1.2).
4. Means shall be provided for the operator to enter criteria for filtering of indication of new NAVWARN messages based on time and distance from own ship, monitored route or planned route (see 11.1.2). Default setting is no filtering.
5. Details of the filtering options that have been enabled by user must be readily available for inspection and modification.
6. Means shall be provided to view the most recent message, past messages, and to view messages associated with selection of NAVWARN symbols in the graphical display area.
7. Listing of all NAVWARN shall include means for viewing an abbreviated view of any **NavwarnPart**, **warningInformation** attributes present.

NOTE 1: It may be possible to create much of this functionality via portrayal context parameters, however, in this version of S-124, this is not included as further trials on S-100 portrayal are needed to assess the feasibility.

NOTE 2: For ECDIS the functions needed to supported these portrayal requirements are described in Annex C of S-98.

### Filtering Navigational Warning information

S-124 Navigational Warnings datasets are intended for use in S-100 ECDIS as elements of an always on layer conforming to S-98 Level 1 interleaving when interoperability is on. There is a risk of clutter with this level of interoperability and it is therefore necessary to include filtering options for the user, to remove all information that is not relevant from the portrayal.

NOTE: Even though a Navigational Warning is not portrayed, it must still be visible and discoverable in a list of NAVWARNs that can be recalled by user action at any time.

User systems should provide filtering mechanisms for the Navigational Warning information.

At a minimum, functionality must be included that allows the user to classify the relevance of a NAVWARN against the intended route as:

* on chart (relevant for the route, must always be visualized); or
* off chart (not relevant for the route, and need not be visualized); or
* information (relevant for the route, but for information and need not be visualized).

On chart should be the default classification for all NAVWARNs.

Additional filtering functions could include options such as;

* filtering on route with a buffer;
* navigational warning topic;
* date range of the hazard; and
* valid time of the navigational warning.

These filters could be used to assist the navigator in classifying a NAVWARN according to its relevance for the route.

EXAMPLE 1: A self-cancelling dataset

**NavwarnPreamble**

**publicationTime** of 20230704T010000Z

**cancellationDate** of 20230711T000000Z

**NavwarnPart**

**fixedDateRange** of 20230706T010000Z to 20230710T010000Z

must be visible on navigation screen during 20230706T010000Z to 20230710T010000Z, unless removed by a filter set by user, and optionally visible during 20230704T010000Z to 20230706T005959Z.

NOTE: It should still be possible for user to recall cancelled messages for review purposes.

EXAMPLE 2: Any dangers that are in waters too shallow for the ship get classified as off chart warnings, but are discoverable in the on call listing of active NAVWARNs.

### Cancelled datasets

When the dataset is cancelled it must not be displayed on the navigation screen, but should be available for review in the on call listing of NAVWARNs in the navigation system and marked as cancelled.

## Portrayal of feature classes

The **NavwarnAreaAffected** class does not have a portrayal defined since this could cause significant cluttering on the navigation screen. Rather, the class must be highlighted by the system if selected from a pick report or by other means for interrogation by user.

When a **NavwarnPart** is not portrayed, such as when user selections mark it not to be visualized, any associated **TextPlacement** features must also not be portrayed.

# Metadata

## Introduction

The S-124 metadata description is a subset of the metadata described in S-100 Part 17, which is a profile of the ISO 19115 standard. The S-124 metadata model restricts the S-100 metadata model to its core elements; S100\_ExchangeCatalogue, S100\_DatasetDiscoveryMetadata, S100\_CatalogueDiscoveryMetadata and S100\_SupportFileDiscoveryMetadata. Moreover, the S100\_DatasetDiscoveryMetadata is further restricted to remove attributes that are not relevant to a Navigational Warning service. Figure 13-1 below shows the details of the S-124 metadata model and the details are further explained in the tables in the subsequent sections.

**Figure 12‑1 – Overview of S-124 discovery metadata**

## Exchange Set Catalogue and Dataset metadata

The tables in this section provide a detailed textual description of the encoding of the S-124 Exchange Set Catalogue.

S100\_ExchangeCatalogue – Exchange Set metadata contains metadata about the contents of the Exchange Set and metadata about the data distributor.

S100\_DatasetDiscoveryMetadata – Dataset metadata describe information about a dataset. It facilitates the management and exploitation of data and is an important requirement for understanding the characteristics of a dataset. Discovery metadata can help users determine whether a product or service is fit for purpose and from where these have been obtained.

S100\_CatalogueDiscoveryMetadata – Catalogue metadata assists in distributing feature and portrayal catalogues for the proper reading and portrayal of S-124 datasets.

S100\_SupportFileDiscoveryMetadata – Support file metadata describe information about a data resource. It facilitates the management and exploitation of data and is an important requirement for understanding the characteristics of a data resource. In S-124 only language packs are considered support files.

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### S100\_ExchangeCatalogue

Each Exchange Set has a single S100\_ExchangeCatalogue which contains meta information for the data and support files in the Exchange Set.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Role Name** | **Name** | **Description** | **Mult** | **Type** | **Remarks** |
| Class | S100\_ExchangeCatalogue | An Exchange Catalogue contains the discovery metadata about the exchange datasets and support files | - | - | - |
| Attribute | identifier | Uniquely identifies this Exchange Catalogue | 0..1 | S100\_ExchangeCatalogueIdentifier |  |
| Attribute | contact | Details about the issuer of this Exchange Catalogue | 0..1 | S100\_CataloguePointOfContact |  |
| Attribute | productSpecification | Details about the Product Specifications used for the datasets contained in the Exchange Catalogue | 0..\* | S100\_ProductSpecification |  |
| Attribute | defaultLocale | Default language and character set used for all metadata records in this Exchange Catalogue | 0..1 | PT\_Locale | Default is English and UTF-8 |
| Attribute | otherLocale | Other languages and character sets used for the localized metadata records in this Exchange Catalogue | 0..\* | PT\_Locale | Required if any localized entries are present in the Exchange Catalogue |
| Attribute | exchangeCatalogueDescription | Description of what the Exchange Catalogue contains | 0..1 | CharacterString |  |
| Attribute | exchangeCatalogueComment | Any additional Information | 0..1 | CharacterString |  |
| Attribute | certificates | Signed public key certificates referred to by digital signatures in the Exchange Set | 0..\* | S100\_SE\_CertificateContainerType | Content defined in S-100 Part 15. All certificates used, except the SA root certificate (installed separately by the implementing system) shall be included |
| Attribute | dataServerIdentifier | Identifies the data server for the permit | 0..1 | CharacterString |  |
| Role | datasetDiscoveryMetadata | Exchange Catalogues may include or reference discovery metadata for the datasets in the Exchange Set | 0..\* | Aggregation S100\_DatasetDiscoveryMetadata |  |
| Role | catalogueDiscoveryMetadata | Metadata for Catalogue | 0..\* | Aggregation S100\_CatalogueDiscoveryMetadata | Metadata for the Feature, Portrayal and Interoperability Catalogues, if any |
| Role | supportFileDiscoveryMetadata | Exchange Catalogues may include or reference discovery metadata for the support files in the Exchange Set | 0..\* | Aggregation S100\_SupportFileDiscoveryMetadata |  |

#### S100\_ExchangeCatalogueIdentifier

| **Role Name** | **Name** | **Description** | **Mult** | **Type** | **Remarks** |
| --- | --- | --- | --- | --- | --- |
| Class | S100\_ExchangeCatalogueIdentifier | An identifier for an Exchange Catalogue . | - | - | The concatenation of identifier, editionNumber and dateTime form the unique name |
| Attribute | identifier | Uniquely identifies this Exchange Catalogue | 1 | CharacterString | <S100XC:identifier>US\_101\_20200101\_120101\_01</S100XC:identifier> |
| Attribute | dateTime | Creation date and time of the Exchange Catalogue, including time zone | 1 | DateTime | Format: yyyy-mm-ddThh:mm:ssZ |

#### S100\_CataloguePointofContact

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Role Name** | **Name** | **Description** | **Mult** | **Type** | **Remarks** |
| Class | S100\_CataloguePointOfContact | Contact details of the issuer of this Exchange Catalogue | - | - | - |
| Attribute | organization | The organization distributing this Exchange Catalogue | 1 | CharacterString | This could be an individual producer, value added reseller, etc |
| Attribute | phone | The phone number of the organization | 0..1 | CI\_Telephone |  |
| Attribute | address | The address of the organization | 0..1 | CI\_Address |  |

### S100\_DatasetDiscoveryMetadata

| **Role Name** | **Name** | **Description** | **Mult** | **Type** | **Remarks** |
| --- | --- | --- | --- | --- | --- |
| Class | S100\_DatasetDiscoveryMetadata | Metadata about the individual datasets in the Exchange Catalogue | - | - | - |
| Attribute | fileName | Dataset file name | 1 | URI | See S-100 Part 1, clause 1-4.6 for how to use including how to capture the path of the file |
| Attribute | description | Short description giving the area or location covered by the dataset | 0..1 | CharacterString | If used, content of this attribute must match the content of the generalArea and locality attributes of the dataset NavwarnPreamble |
| Attribute | datasetID | Dataset ID expressed as a Marine Resource Name | 0..1 | URN | The URN must be an MRN and if used match the value of interoperabilityIdentifier in the messageSeriesIdentifier |
| Attribute | compressionFlag | Indicates if the resource is compressed | 1 | Boolean | *True* indicates a compressed dataset resource  *False* indicates an uncompressed dataset resource |
| Attribute | dataProtection | Indicates if the data is encrypted | 1 | Boolean | *True* indicates an encrypted dataset resource  *False* indicates an unencrypted dataset resource  Must be set to *False* |
| Attribute | digitalSignatureReference | Specifies the algorithm used to compute digitalSignatureValue | 1 | S100\_SE\_DigitalSignatureReference  (see S-100 Part 15) |  |
| Attribute | digitalSignatureValue | Value derived from the digital signature | 1..\* | S100\_SE\_DigitalSignature  (see S-100 Part 15) | The value resulting from application of digitalSignatureReference  Implemented as the digital signature format specified in S-100 Part 15 |
| Attribute | copyright | Indicates if the dataset is copyrighted | 1 | Boolean | *True* indicates the resource is copyrighted  *False* Indicates the resource is not copyrighted |
| Attribute | classification | Indicates the security classification of the dataset | 0..1 | Class MD\_SecurityConstraints>MD\_ClassificationCode (codelist) | 1. unclassified  2. restricted  3. confidential  4. secret  5. top secret  6. sensitive but unclassified  7. for official use only  8. protected  9. limited distribution |
| Attribute | purpose | The purpose for which the dataset has been issued | 0..1 | S100\_Purpose | Only values permitted are ‘newDataset’ or ‘cancellation’. |
| Attribute | notForNavigation | Indicates the dataset is not intended to be used for navigation | 1 | Boolean | *True* indicates the dataset is not intended to be used for navigation  *False* indicates the dataset is intended to be used for navigation |
| Attribute | specificUsage | The use for which the dataset is intended | 0..1 | MD\_USAGE>specificUsage (character string) | Must always be ‘Navigational Warning Service’ |
| Attribute | issueDate | Date on which the data was made available by the Data Producer | 1 | Date |  |
| Attribute | issueTime | Time of day at which the data was made available by the Data Producer | 0..1 | Time | The S-100 datatype Time |
| Attribute | boundingBox | The extent of the dataset limits | 1 | EX\_GeographicBoundingBox | Used to give the extent of the NAVWARN information |
| Attribute | temporalExtent | Specification of the temporal extent of the dataset | 0..1 | S100\_TemporalExtent | The temporal extent is encoded as the date/time of the earliest and latest data records (in coverage datasets) or date/time ranges (in vector datasets)  This attribute is only used when a NAVWARN have a known expiry date and time. When used the values must align with the publicationTime and cancellationDate attributes of the dataset NavwarnPreamble |
| Attribute | productSpecification | The Product Specification used to create this dataset | 1 | S100\_ProductSpecification |  |
| Attribute | producingAgency | Agency responsible for producing the data | 1 | CI\_Responsibility>CI\_Organisation |  |
| Attribute | producerCode | The official IHO Producer Code from S-62 | 0..1 | CharacterString |  |
| Attribute | encodingFormat | The encoding format of the dataset | 1 | S100\_EncodingFormat | Must be value 2 (GML) |
| Attribute | comment | Any additional information | 0..1 | CharacterString |  |
| Attribute | defaultLocale | Default language and character set used in the dataset | 0..1 | PT\_Locale | In absence of defaultLocale the language is English, UTF-8 |
| Attribute | otherLocale | Other languages and character sets used in the dataset | 0..\* | PT\_Locale |  |
| Attribute | metadataPointOfContact | Point of contact for metadata | 0..1 | CI\_Responsibility>CI\_Individual or  CI\_Responsibility>CI\_Organisation | Only if metadataPointOfContact is different to producingAgency |
| Attribute | metadataDateStamp | Date stamp for metadata | 0..1 | Date | May or may not be the issue date |

#### S100\_Purpose

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Role Name** | **Name** | **Description** | **Code** | **Remarks** |
| Enumeration | S100\_Purpose | The purpose of the dataset | - |  |
| Value | newDataset | Brand new dataset | 1 | No data has previously been produced for this area |
| Value | newEdition | New edition of the dataset or Catalogue | 2 | Includes new information which has not been previously distributed by updates |
| Value | update | Dataset update | 3 | Changing some information in an existing dataset |
| Value | reissue | Dataset that has been re-issued | 4 | Includes all the updates applied to the original dataset up to the date of the re-issue. A re-issue does not contain any new information additional to that previously issued by updates |
| Value | cancellation | Dataset or Catalogue that has been cancelled | 5 | Indicates the dataset or Catalogue should no longer be used and can be deleted |
| Value | delta | Dataset difference | 6 | Reserved for future use |

#### S100\_TemporalExtent

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Role Name** | **Name** | **Description** | **Mult** | **Type** | **Remarks** |
| Class | S100\_TemporalExtent | Temporal extent | -- |  | At least one of the timeInstantBegin and timeInstantEnd attributes must be populated; if both are known, both must be populated. The absence of either begin or end indicates indefinite validity in the corresponding direction, limited by the issue date/time or the cancellation or supersession of the dataset |
| Attribute | timeInstantBegin | The instant at which the temporal extent begins | 0..1 | DateTime |  |
| Attribute | timeInstantEnd | The instant at which the temporal extent ends | 0..1 | DateTime |  |

EXAMPLE: An S-124 dataset warning about scheduled works has the following data for *temporalExtent* encoded in the dataset discovery block in the Exchange Catalogue:

<temporalExtent>  
 <timeInstantBegin>2023-07-10T06 :00 :00Z</timeInstantBegin>  
 <timeInstantEnd>2023-07-14T18 :00 :00Z</timeInstantEnd>  
</temporalExtent>

indicating that the temporal extent of the works described in the dataset is the period beginning at exactly 6 a.m. on 10 July 2023 (UTC) and ending at exactly 6 p.m. on 14 July 2023 (UTC).

#### S100\_EncodingFormat

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Role Name** | **Name** | **Description** | **Code** | **Remarks** |
| Enumeration | S100\_DataFormat | The encoding format | - | - |
| Value | ISO/IEC 8211 | The ISO 8211 data format as defined in S-100 Part 10a | 1 | - |
| Value | GML | The GML data format as defined in S-100 Part 10b | 2 | - |
| Value | HDF5 | The HDF5 data format as defined in S-100 Part 10c | 3 | - |
| Value | undefined | The encoding is defined in the Product Specification | 100 | Use of Product Specification specific encoding means the data product and Product Specification is not intended for an IHO S-100 compliant system |

#### S100\_ProductSpecification

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Role Name** | **Name** | **Description** | **Mult** | **Type** | **Remarks** |
| Class | S100\_ProductSpecification | The Product Specification contains the information needed to build the specified product | - | - | - |
| Attribute | name | The name of the Product Specification used to create the datasets | 0..1 | CharacterString | Must be Navigational Warnings |
| Attribute | version | The version number of the Product Specification | 0..1 | CharacterString | Must be 1.0.0 |
| Attribute | date | The version date of the Product Specification | 0..1 | Date | Publication date of this document |
| Attribute | productIdentifer | Machine readable unique identifier of a product type | 1 | CharacterString  (Restricted to Product ID values from the IHO Product Specification Register, in the IHO Geospatial Information Registry) | Must be S-124 |
| Attribute | number | The number used to lookup the product in the Product Specification Register of the IHO GI registry | 1 | Integer | For IHO Product Specifications these should be taken from the IHO Product Specification Register in the IHO Geospatial Information (GI) Registry |
| Attribute | compliancyCategory | The level of compliance of the Product Specification to S-100 | 0..1 | S100\_CompliancyCategory | Must be category 3 |

##### **S100\_CompliancyCategory**

| **Role Name** | **Name** | **Description** | **Code** | **Remarks** |
| --- | --- | --- | --- | --- |
| Enumeration | S100\_CompliancyCategory |  | - | - |
| Value | category1 | IHO S-100 object model compliant | 1 |  |
| Value | category2 | IHO S-100 compliant with non-standard encoding | 2 |  |
| Value | category3 | IHO S-100 compliant with standard encoding | 3 |  |
| Value | category4 | IHO S-100 and IMO harmonized display compliant | 4 |  |

### S100\_SupportFileDiscoveryMetadata

| **Role Name** | **Name** | **Description** | **Mult** | **Type** | **Remarks** |
| --- | --- | --- | --- | --- | --- |
| Class | S100\_SupportFileDiscoveryMetadata | Metadata about the individual support files in the Exchange Catalogue | - | - | - |
| Attribute | fileName | Name of the support file | 1 | URI | See Part1, clause 1-4.6 |
| Attribute | revisionStatus | The purpose for which the support file has been issued | 1 | S100\_SupportFileRevisionStatus | For example new, replacement, etc |
| Attribute | editionNumber | The Edition number of the support file | 1 | Integer | When a data set is initially created, the Edition number 1 is assigned to it. The Edition number is increased by 1 at each new Edition. Edition number remains the same for a re-issue |
| Attribute | issueDate | Date on which the data was made available by the Data Producer | 0..1 | Date |  |
| Attribute | supportFileSpecification | The specification used to create this file | 0..1 | S100\_SupportFileSpecification |  |
| Attribute | dataType | The format of the support file | 1 | S100\_SupportFileFormat |  |
| Attribute | otherDataTypeDescription | Support file format other than those listed | 0..1 | CharacterString |  |
| Attribute | comment | Optional comment | 0..1 | CharacterString |  |
| Attribute | compressionFlag | Indicates if the resource is compressed | 1 | Boolean | *True* indicates a compressed resource  *False* indicates an uncompressed resource |
| Attribute | digitalSignatureReference | Specifies the algorithm used to compute digitalSignatureValue | 1 | S100\_SE\_DigitalSignatureReference  (see S-100 Part 15) |  |
| Attribute | digitalSignatureValue | Value derived from the digital signature | 1..\* | S100\_SE\_DigitalSignature  (see S-100 Part 15) | The value resulting from application of digitalSignatureReference  Implemented as the digital signature format specified in S-100 Part 15 |
| Attribute | defaultLocale | Default language and character set used in the support file | 0..1 | PT\_Locale | In absence of defaultLocale the language is English in UTF-8  A support file is expected to use only one as locale. Additional support files can be created for other locales |
| Attribute | supportedResource | Identifier of the resource supported by this support file | 0..\* | CharacterString | Conventions for identifiers are detailed in S-100 Part 15. S-100 allows file URI, digital signature or cryptographic hash checksums to be used. |
| Attribute | resourcePurpose | The purpose of the supporting resource | 0..1 | S100\_ResourcePurpose | Identifies how the supporting resource is used |

#### S100\_SupportFileFormat

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Role Name** | **Name** | **Description** | **Code** | **Remarks** |
| Enumeration | S100\_SupportFileFormat | The format used for the support file | - | - |
| Value | ASCII | UTF-8 text excluding control codes | 1 | - |
| Value | JPEG2000 | JPEG2000 format | 2 | ISO 15444 |
| Value | HTML | Hypertext Markup Language | 3 |  |
| Value | XML | Extensible Markup Language | 4 |  |
| Value | XSLT | Extensible Stylesheet Language Transformations | 5 |  |
| Value | VIDEO | Representation of moving images in unspecified format | 6 |  |
| Value | TIFF | Tagged Image File Format | 7 |  |
| Value | PDF/AorUA | Portable Document Format | 8 | ISO 19005, ISO 32000  Product Specification developers should take careful consideration in using PDF as a support file format. It is recommended that PDF never be used in products that will be used on a navigation system as it may impair night vision  Must be PDF/A or UA |
| Value | LUA | Lua programming language | 9 |  |
| Value | other | Other format | 100 |  |

#### S100\_SupportFileRevisionStatus

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Role Name** | **Name** | **Description** | **Code** | **Remarks** |
| Enumeration | S100\_SupportFileRevisionStatus | The reason for inclusion of the support file in this Exchange Set | - | - |
| Value | new | A file which is new | 1 | Signifies a new file |
| Value | replacement | A file which replaces an existing file | 2 | Signifies a replacement for a file of the same name |
| Value | deletion | Deletes an existing file | 3 | Signifies deletion of a file of that name |

#### S100\_SupportFileSpecification

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Role Name** | **Name** | **Description** | **Mult** | **Type** | **Remarks** |
| Class | S100\_SupportFileSpecification | The standard or specification to which a support file conforms | - | - | - |
| Attribute | name | The name of the specification used to create the support file | 1 | CharacterString |  |
| Attribute | version | The version number of the specification | 0..1 | CharacterString |  |
| Attribute | date | The version date of the specification | 0..1 | Date |  |

#### S100\_ResourcePurpose

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Role Name** | **Name** | **Description** | **Code** | **Remarks** |
| Enumeration | S100\_ResourcePurpose | Defines the purpose of the supporting resource | - | - |
| Value | supportFile | A support file | 1 |  |
| Value | ISOMetadata | Dataset metadata in ISO format | 2 |  |
| Value | languagePack | A Language pack | 3 |  |
| Value | GMLSchema | GML Application Schema | 4 |  |
| Value | other | A type of resource not otherwise described | 100 |  |

### S100\_CatalogueDiscoveryMetadata

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Role Name** | **Name** | **Description** | **Mult** | **Type** | **Remarks** |
| Class | S100\_CatalogueDiscoveryMetadata | Class for S-100 Catalogue metadata | - | - | - |
| Attribute | fileName | The name for the Catalogue | 1 | URI | See S-00 Part 1, clause 1-4.6 |
| Attribute | purpose | The purpose for which the Catalogue has been issued | 0..1 | S100\_Purpose  (codelist) | The values must be one of the following:  *2* new edition  *5* cancellation  Default is new edition |
| Attribute | editionNumber | The Edition number of the Catalogue | 1 | Integer | Initially set to 1 for a given productSpecification.number  Increased by 1 for each subsequent newEdition  Uniquely identifies the version of the Catalogue |
| Attribute | scope | Subject domain of the Catalogue | 1 | S100\_CatalogueScope |  |
| Attribute | versionNumber | The version identifier of the Catalogue | 1 | CharacterString | Human readable version identifier |
| Attribute | issueDate | The issue date of the Catalogue | 1 | Date |  |
| Attribute | productSpecification | The Product Specification used to create this file | 1 | S100\_ProductSpecification |  |
| Attribute | digitalSignatureReference | Specifies the algorithm used to compute digitalSignatureValue | 1 | S100\_SE\_DigitalSignatureReference  (see Part 15) |  |
| Attribute | digitalSignatureValue | Value derived from the digital signature | 1..\* | S100\_SE\_DigitalSignature  (see Part 15) | The value resulting from application of digitalSignatureReference  Implemented as the digital signature format specified in Part 15 |
| Attribute | compressionFlag | Indicates if the resource is compressed | 1 | Boolean | *True* indicates a compressed resource  *False* indicates an uncompressed resource |
| Attribute | defaultLocale | Default language and character set used in the Catalogue | 0..1 | PT\_Locale | In absence of defaultLocale the language is English in UTF-8 |
| Attribute | otherLocale | Other languages and character sets used in the Catalogue | 0..\* | PT\_Locale |  |

#### S100\_CatalogueScope

| **Role Name** | **Name** | **Description** | **Code** | **Remarks** |
| --- | --- | --- | --- | --- |
| Enumeration | S100\_CatalogueScope | The scope of the Catalogue | - | - |
| Value | featureCatalogue | S-100 Feature Catalogue | 1 |  |
| Value | portrayalCatalogue | S-100 Portrayal Catalogue | 2 |  |
| Value | interoperabilityCatalogue | S-100 Interoperability Catalogue | 3 |  |

#### PT\_Locale

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Role Name** | **Name** | **Description** | **Mult** | **Type** | **Remarks** |
| Class | PT\_Locale | Description of a locale | - | - | From ISO 19115-1 |
| Attribute | language | Designation of the locale language | 1 | LanguageCode | ISO 639-2/T 3-letter language codes. |
| Attribute | country | Designation of the specific country of the locale language | 0..1 | CountryCode | ISO 3166-2 2-letter country codes |
| Attribute | characterEncoding | Designation of the character set to be used to encode the textual value of the locale | 1 | MD\_CharacterSetCode | UTF-8 is used in S-100 |

**Table 17-2 – Individuals (restriction of CI\_Individual from ISO 19115-1)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Path** | **Datasets** | **Other resources** |
| Name of the individual | CI\_Individual.name | **C** *(documented if ‘positionName’* and *‘partyIdentifier’ not documented)* | **C** *(same as for dataset)* |
| Position of the individual in an organization | CI\_Individual.positionName | **C**  *(documented if ‘name’ and ‘partyIdentifier’* *not documented)* | **C**  *(same as for dataset)* |
| Contact information for the individual | CI\_Individual > contactInfo > CI\_Contact | **M**  (see note 2) | **M**  (see note 2) |
| Identifier for the party | CI\_Individual.partyIdentifier | **C**  *(documented if ‘name’ and ‘positionName’ not documented* | **C**  *(same as for dataset)* |

**Table 17-3 – Organisations (restriction of CI\_Organisation from ISO 19115-1)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Path** | **Datasets** | **Other resources** |
| Name of the organisation | CI\_Organisation.name | **C** *(documented if ‘positionName’ not documented* – see Note 1*)* | **C** *(same as for dataset)* |
| Position of an individual in the organisation | CI\_Organisation.positionName | **C**  *(documented if ‘name’ not documented* – see Note 1*)* | **C**  *(same as for dataset)* |
| Contact information for the organisation | CI\_Organisation.contactInfo > CI\_Contact | **M**  (see note 2) | **M**  (see note 2) |
| Identifier for the party | CI\_Organisation.partyIdentifier | **C**  *(documented if ‘name’ and ‘positionName’ not documented* | **C**  *(same as for dataset)* |

NOTE 1: S-100 restricts ISO 19115-1 in that documenting the ‘logo’ attribute of CI\_Organisation is not sufficient to allow omission of both ‘name’ and ‘positionName’.

NOTE 2: At least one of CI\_Contact attributes phone / address / onlineResource / contactInstructions must be documented.

# ANNEX A - Data Classification and Encoding Guide

The latest version of the Data Classification and Encoding Guide (DCEG) is found on the website:

[S-124 document management page – www.bshc.pro](https://www.bshc.pro/s-124-document-management-page/)

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# ANNEX B - Feature Catalogue

**Name:** Navigational Warnings Feature Catalogue

**Scope:**

**Version Number:** 2.0.0

**Version Date:** 15 November 2024

**Producer:**

International Hydrographic Bureau,   
4 quai Antoine 1er,

B.P. 445

MC 98011 MONACO CEDEX

Telephone: +377 93 10 81 00

Fax: + 377 93 10 81 40

Email: [info@iho.int](mailto:info@iho.int)

**Language:** English

Human readable version is supplied as Annex B-1.

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# ANNEX C - GML Schema

This data format conforms to the profile described in S-100 Part 10b, which is based on GML. The schema is contained in the schema files and references S-100 components where appropriate.

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# ANNEX D - Portrayal Catalogue

**Name:** Navigational Warnings Portrayal Catalogue

**Scope:** Navigational Warnings

**Version Number:** 2.0.0

**Version Date:** 15 November 2024

**Producer:**

International Hydrographic Bureau,   
4 quai Antoine 1er,

B.P. 445

MC 98011 MONACO CEDEX

Telephone: +377 93 10 81 00

Fax: + 377 93 10 81 40

Email: [info@iho.int](mailto:info@iho.int)

**Language:** English

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# ANNEX E - Implementation Guide

1. System using S-124 in a navigation setting should treat S-124 datasets as overlay information to the underlying chart.
2. There are no restrictions what the underlying chart means, but in most cases will be an ENC conforming to either the S-57 or S-101 Product Specifications as issued by IHO.
3. The S-98 Interoperability Catalogue standard, specifies requirements for S-100 ECDIS using S-124 in a navigational setting. This includes that:
   1. S-124 compliant ECDIS should have a function to generate an electronic report that can be used by the inspector for comparison with the latest in-force NAVWARN list from the service website, and;
   2. a function to generate a report that shows changes since last update request, for example what has been cancelled and what is new.
4. It is envisioned that this section will be enhanced with more guidance will be added as experience is gained. Two main areas of guidance is being studied, production system guidance and user system guidance.

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# ANNEX F - Transformation Into NAVTEX

This appendix will be developed further in subsequent versions of this document.

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# ANNEX G - Transformation Into EGC

This appendix will be developed further in subsequent versions of this document.

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# ANNEX H - Soft List

Soft List of NAVWARN general types to detail types cross mapping. The aids to navigation section has sub sections, due to its length. These sub sections do not appear in the data model. Those general sections that do not have any details listings stand by themselves and can only be amplified by using the text attributes in the complex attribute **warningInformation**.

The Soft List is not a normative grouping, and is intended to help implementors of the S-124 Product Specification with grouping the large number of NAVWARN types. The list is meant as a recommended mapping between the various general types and the various detailed types. For example, an operator could be presented with the general types and through an interface be given only the detailed types that this Soft List has mapped to that general type. This represents a filtering of choices down to what is considered most logical from a general type to the detailed type.

|  |  |
| --- | --- |
| **TypeGeneral** | **TypeDetails** |
| drifting hazards | container adrift |
|  | derelict vessel adrift |
|  | dead whale adrift |
|  | deadhead adrift |
|  | dock adrift |
|  | fishing net adrift |
|  | log adrift |
|  | log boom adrift |
|  | floating debris |
|  | vessel adrift |
|  | object adrift |
|  | scientific buoy adrift |
| **TypeGeneral** | **TypeDetails** |
| newly discovered dangers | sandspit or sandbar change |
|  | shallow depth reported |
|  | shallow depth confirmed |
|  | presence of submerged fishing net |
|  | submerged object |
|  | uncharted rock |
|  | dangerous wreck |
|  | subsurface mooring |
| **TypeGeneral** | **TypeDetails** |
| offshore infrastructure | submarine cable changes |
|  | submarine pipeline changes |
|  | offshore rigs or platform changes |
|  | drilling site operations |
|  | renewable energy device or farm change |
| **TypeGeneral** | **TypeDetails** |
| rig list | nil |
| **TypeGeneral** | **TypeDetails** |
| In-force bulletin | nil |
| **TypeGeneral** | **TypeDetails** |
| ECDIS operating anomalies including official data issues | nil |
| **TypeGeneral** | **TypeDetails** |
| piracy or robbery | nil |
| **TypeGeneral** | **TypeDetails** |
| communication or broadcast service change | EGC MSI service |
|  | HF service |
|  | MF service |
|  | MSI service |
|  | NAVTEX service change |
|  | VHF service change |
| **TypeGeneral** | **TypeDetails** |
| scientific instruments change | acoustic recorder |
|  | presence of scientific equipment |
|  | scientific moorings |
|  | tide gauge change |
| **TypeGeneral** | **TypeDetails** |
| routeing change | cluster of fishing vessels |
|  | exclusion zone |
|  | fireworks |
|  | presence of marine mammals |
|  | opening or closing of harbour |
|  | opening or closing of swing bridge |
|  | opening or closing of waters |
|  | bridge horizontal clearance change |
|  | bridge unable to close |
|  | bridge unable to open |
|  | bridge vertical clearance change |
|  | lock closed |
|  | regatta or race |
|  | new or amended regulation |
|  | restricted area changes |
|  | swimmers |
|  | traffic congestion |
|  | horizontal clearance reduced |
|  | vertical clearance reduced |
|  | vessel disabled |
|  | VTS change |
|  | waterway recommended or not recommended for shipping |
|  | radar surveillance system service change |
| **TypeGeneral** | **TypeDetails** |
| security requirement change | maritime security level changes |
|  | security regulation change |
| **TypeGeneral** | **TypeDetails** |
| special operations | sea trials |
|  | seaplane operations |
|  | military exercise |
|  | military operation |
|  | blasting operation |
|  | firing exercise |
|  | hydrographic survey activity |
|  | scientific survey |
|  | anti pollution exercise |
|  | anti pollution operation |
|  | SAR exercise |
|  | SAR operation |
|  | seismic survey operation |
|  | jamming exercise |
| **TypeGeneral** | **TypeDetails** |
| dangerous natural phenomena | tsunami warning |
|  | volcano activity |
|  | low water level |
|  | high water level |
|  | storm surge |
| **TypeGeneral** | **TypeDetails** |
| towing operations | drill rig under tow |
|  | unwieldy tow |
| **TypeGeneral** | **TypeDetails** |
| health advisories | national health authority notice |
|  | World Health Organization notice |
|  | local health authority notice |
| **TypeGeneral** | **TypeDetails** |
| ice information | ice boom - installation or removal |
|  | ice control zone in-force or deactivated |
|  | iceberg outside advertised limits |
|  | unidentified radar target - possible iceberg |
|  | authorized ice routeing information |
| **TypeGeneral** | **TypeDetails** |
| other hazards | presence of naval mines |
|  | explosive device |
|  | fallout hazard |
|  | hazardous area |
| **TypeGeneral** | **TypeDetails** |
| aquaculture and fishing installations | aquaculture site |
|  | Fish Aggregating Device |
|  | presence of long fishing gear |
|  | numerous fishing vessels |
| **TypeGeneral** | **TypeDetails** |
| works | dredging operation |
|  | breakwater construction |
|  | wharf construction |
|  | works in progress |
|  | diving operation |
|  | cable laying operation |
|  | pipe laying operation |
|  | cable operations |
|  | pipe operations |
|  | underwater operations |
| **TypeGeneral** | **TypeDetails** |
| aids to navigation changes | ***Buoyage*** |
|  | temporary buoyage |
|  | ***Buoy*** |
|  | light buoy - light damaged |
|  | light buoy - light not synchronized |
|  | light buoy - light unlit |
|  | light buoy - light unreliable |
|  | light spar buoy - light damaged |
|  | light spar buoy - light not synchronized |
|  | light spar buoy - light unlit |
|  | light spar buoy - light unreliable |
|  | buoy missing |
|  | buoy move |
|  | buoy off position |
|  | buoy adrift |
|  | buoy damaged |
|  | buoy restored to normal |
|  | buoy destroyed |
|  | buoy re-established |
|  | buoy topmark missing |
|  | buoy topmark damaged |
|  | buoy daymark unreliable |
|  | buoy will be withdrawn |
|  | buoy withdrawn |
|  | buoy withdrawn for winter |
|  | buoy replaced by winter spar |
|  | buoy decommissioned for winter |
|  | buoy commissioned for navigation season |
|  | marine aids to navigation unreliable |
|  | fairway marker - light unlit |
|  | fairway marker - light unreliable |
|  | fairway marker - light not synchronized |
|  | fairway marker damaged |
|  | fairway marker destroyed |
|  | seasonal decommissioning complete |
|  | seasonal decommissioning in progress |
|  | seasonal commissioning complete |
|  | seasonal commissioning in progress |
|  | spar buoy adrift |
|  | spar buoy damaged |
|  | spar buoy destroyed |
|  | spar buoy missing |
|  | spar buoy move |
|  | spar buoy off position |
|  | spar buoy re-established |
|  | spar buoy restored to normal |
|  | spar buoy topmark missing |
|  | spar buoy withdrawn |
|  | ***Light/sector light*** |
|  | light unlit |
|  | light unreliable |
|  | light re-establishment |
|  | light range reduced |
|  | light without rhythm |
|  | light out of synchronization |
|  | light daymark unreliable |
|  | light operating properly |
|  | sector light - sector obscured |
|  | ***Beacon*** |
|  | beacon missing |
|  | beacon damaged |
|  | lighted beacon - light unlit |
|  | lighted beacon - light unreliable |
|  | lighted beacon - light not synchronized |
|  | lighted beacon - light damaged |
|  | beacon topmark missing |
|  | beacon topmark damaged |
|  | beacon daymark unreliable |
|  | floodlit beacon - unlit |
|  | beacon restored to normal |
|  | ***Leading lights and beacons*** |
|  | front light unlit |
|  | rear light unlit |
|  | front light unreliable |
|  | rear light unreliable |
|  | front light range reduced |
|  | rear light range reduced |
|  | front light without rhythm |
|  | rear light without rhythm |
|  | front and rear lights out of synchronization |
|  | front beacon unreliable |
|  | rear beacon unreliable |
|  | front light is operating properly |
|  | rear light is operating properly |
|  | front beacon restored to normal |
|  | rear beacon restored to normal |
|  | ***Audible and Fog signals*** |
|  | audible signal out of service |
|  | fog signal out of service |
|  | audible signal operating properly |
|  | fog signal operating properly |
|  | ***Radionavigation aids, signal and radio aids*** |
|  | AIS transmitter out of service |
|  | AIS transmitter unreliable |
|  | AIS transmitter operating properly |
|  | V-AIS out of service |
|  | V-AIS unreliable |
|  | V-AIS operating properly |
|  | RACON out of service |
|  | RACON unreliable |
|  | RACON operating properly |
|  | RAMARK out of service |
|  | RAMARK unreliable |
|  | RAMARK operating properly |
|  | DGPS out of service |
|  | DGPS operating properly |
|  | DGPS unreliable |
|  | LORAN C - operating properly |
|  | LORAN C - unreliable |
|  | LORAN C - out of service |
|  | eLORAN operating properly |
|  | eLORAN unreliable |
|  | eLORAN out of service |
|  | DGLONASS operating properly |
|  | DGLONASS unreliable |
|  | DGLONASS out of service |
|  | Chayka operating properly |
|  | Chayka unreliable |
|  | Chayka out of service |
|  | e-Chayka operating properly |
|  | e-Chayka unreliable |
|  | e-Chayka out of service |
|  | EGNOS operating properly |
|  | EGNOS unreliable |
|  | EGNOS out of service |
|  | GNSS degradation |
|  | ***AtoN commissioning*** |
|  | buoy establishment |
|  | light establishment |
|  | beacon establishment |
|  | audible signal establishment |
|  | fog signal establishment |
|  | AIS transmitter establishment |
|  | V-AIS establishment |
|  | RACON establishment |
|  | RAMARK establishment |
|  | DGPS station establishment |
|  | eLORAN station establishment |
|  | DGLONASS station establishment |
|  | e-Chayka station establishment |
|  | EGNOS station establishment |
|  | buoy temporary establishment |
|  | light temporary establishment |
|  | beacon temporary establishment |
|  | audible signal temporary establishment |
|  | fog signal temporary establishment |
|  | AIS temporary establishment |
|  | V-AIS temporary establishment |
|  | RACON temporary establishment |
|  | RAMARK temporary establishment |
|  | ***AtoN change*** |
|  | buoy change |
|  | buoy temporary change |
|  | light change |
|  | light temporary change |
|  | sector light change |
|  | sector light temporary change |
|  | beacon change |
|  | beacon temporary change |
|  | fog signal change |
|  | fog signal temporary change |
|  | audible signal change |
|  | audible signal temporary change |
|  | V-AIS change |
|  | V-AIS temporary change |
|  | RACON change |
|  | RACON temporary change |
|  | RAMARK change |
|  | RAMARK temporary change |
|  | ***AtoN removal*** |
|  | buoy removal |
|  | buoy temporary removal |
|  | light removal |
|  | light temporary removal |
|  | beacon removal |
|  | beacon temporary removal |
|  | fog signal removal |
|  | fog signal temporary removal |
|  | audible signal removal |
|  | audible signal temporary removal |
|  | AIS transmitter removal |
|  | AIS transmitter temporary removal |
|  | V-AIS removal |
|  | V-AIS temporary removal |
|  | RACON removal |
|  | RACON temporary removal |
|  | RAMARK removal |
|  | RAMARK temporary removal |
|  | DGPS station removal |
|  | DGPS station temporary removal |
|  | EGNOS station removal |
|  | EGNOS station temporary removal |
|  | LORAN C station removal |
|  | LORAN C station temporary removal |
|  | eLORAN station removal |
|  | eLORAN station temporary removal |
|  | Chayka station removal |
|  | Chayka station temporary removal |
|  | e-Chayka station removal |
|  | e-Chayka station temporary removal |
|  | ***all AtoN unreliable*** |
|  | all aids to navigation unreliable |
|  | ***End of incident*** |
|  | AtoN operating properly |
| End of list | |

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