

S-xxx

**Annex X**

*<Only if an Annex/Appendix to a main publication>*

# Document Title

**Edition n.n.n – Month 20xx**

**IHO**



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<NOTE: This template is to be used by developers of S-100 based product specifications. The main guidance for creating an S-100 product specification is found in S-100 Part 11. However, it may be necessary to refer to other parts of S-100 for more information and guidance for particular sections, therefore references to relevant parts of S-100 have been added to certain clause headings.>

<This template is not normative as regards document styles.>



## Document History

Changes to this Specification are coordinated by the [Working Group or Project Team]. New editions will be made available via the IHO web site. Maintenance of the Specification shall conform to IHO Resolution 2/2007 (as amended).

## **Summary of Substantive Changes in Edition X.X.X**

<This table need not be populated before the first operational edition, nominally Edition 2.0.0. This section may therefore be omitted in earlier editions.>

**Bold references in the Clauses Affected column indicate the principal sections/clauses that are affected by the described change.**

Change Summary	Clauses Affected

Page intentionally left blank

## 1 Overview

*<This clause provides general introductory information about the product specification>*

### 1.1 Introduction

*<Provide a general introduction regarding the intent and use of this product specification>*

### 1.2 Scope

*<The template below may be modified or extended at Product Specification developer discretion.>*

This document describes an S-100 compliant Product Specification for the encapsulation and data transfer of *<phrase describing data product>* for use in *<intended application(s)>*. This Product Specification includes the content model, the encoding, the feature catalogue and metadata.

*<Optional sentence(s) summarizing use scenario(s) for the product may be added if relevant to the scope.>*

### 1.3 References

S-100 IHO Universal Hydrographic Data Model

*<Insert other references>*

### 1.4 Terms, definitions, and abbreviations

#### 1.4.1 Terms and definitions

*<Insert Terms and Definitions>*

#### 1.4.2 Abbreviations

*<Insert Abbreviations>*

### 1.5 Use of language

Within this document:

- “Must” indicates a mandatory requirement.
- “Should” indicates an optional requirement, that is the recommended process to be followed, but is not mandatory.
- “May” means “allowed to” or “could possibly”, and is not mandatory.

### 1.6 General data product description

NOTE: This clause provides general information regarding the data product.

**Title:** *<This field and the “Name” in the GI Registry Product Specification register must be the same.>*

**Abstract:**

**Content:**

**Spatial Extent:**

**Description:**

**East Bounding Longitude:**

**West Bounding Longitude:**

**North Bounding Latitude:**

**South Bounding Latitude:**

**Purpose:**

## 1.7 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. The language describing maintenance should be modified as appropriate.>*

**Title:** <Title of the Product Specification>

**S-100 Version:** X.X.X

**S-1XX Version:** N.N.N

**Date:**

**Language:**

**Classification:**

**Contact:**

**URL:**

**Identifier:**

**Maintenance:** Changes to the Product Specification S-1XX are coordinated by *<responsible group or project team>* and made available via the IHO Publications web site. Maintenance of the Product Specification must conform to IHO Technical Resolution 2/2007 (as amended).

### 1.7.1 IHO Product Specification Maintenance

*<This clause should be retained in IHO Product Specifications, for non IHO Product Specifications it may be removed or modified to meet the needs of the organization.>*

#### 1.7.1.1 Introduction

Changes to S-1XX will be released by the IHO as a new edition, revision, or clarification.

#### 1.7.1.2 New Edition

New Editions of S-1XX 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-1XX.

#### 1.7.1.3 Revisions

*Revisions* are defined as substantive semantic changes to S-1XX. Typically, revisions will change S-1XX to correct factual errors; 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-10s. All cumulative *clarifications* must be included with the release of approved corrections 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 or portrayal catalogue will result in a revision of **S-1XX**.

#### 1.7.1.4 Clarification

Clarifications are non-substantive changes to **S-1XX**. Typically, clarifications: remove ambiguity; correct grammatical and spelling errors; amend or update cross references; insert improved graphics in spelling, punctuation and grammar. A clarification must not cause any substantive semantic change to **S-1XX**.

Changes in a clarification are minor and ensure backward compatibility with the previous versions within the same Edition. Within the same Edition, a dataset of one clarification version could always be processed with a later version of the feature and portrayal catalogues, and a portrayal catalogue can always rely on earlier versions of the feature catalogues.

#### 1.7.1.5 Version Numbers

The associated version control numbering to identify changes (n) to **S-1XX** must be as follows:

New Editions denoted as **n.0.0**

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

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

## 2 Specification Scopes

*< Some parts of a product specification may apply to the whole product whereas other parts of the product specification may apply to parts of the product. Coordinate reference system will generally apply to the complete product; whereas maintenance regimes may be different for features. If a specification is homogeneous across the whole data product it is only necessary to define a general scope (root scope), to which each section of the data product specification applies>*

**Scope ID:**

**Level:**

**Level name:**

## 3 Dataset Identification

*<Information that uniquely identifies the dataset>*

**Title:**

**Alternate Title:**

**Abstract:**

**Topic Category:**

**Geographic Description:**

**Spatial Resolution:**

**Purpose:**

**Language:**

**Classification:** Data can be classified as one of the following:

- Unclassified
- Restricted
- Confidential
- Secret
- Top Secret
- Sensitive But Unclassified
- For Official Use Only
- Protected
- Limited Distribution

**Spatial Representation Type:**

**Point of Contact:**

**Use Limitation:**

## 4 Data Content and structure

### 4.1 Introduction

*<This template was designed for feature based product specifications. Although the conventional approach is to consider an image or a grid as a unique entity on its own, and to not consider a feature structure, it is proper to consider imagery, gridded and coverage data as feature oriented data. In the simplest form, an image or any set of gridded data can be considered as a single feature. Thus rules for application schema for feature data apply to imagery and gridded data. However, care must be taken to ensure that the application schema accurately defines the Imagery and Gridded Data Spatial Schema in accordance with S-100 Part 8 Clause 8-6 and the Gridded Data Spatial Referencing as defined in Clause 8-8. If the product contains a series or set of images or gridded data sets, then the application schema defining the spatial relationships should be defined as specified in S-100 Part 8 Clause 8-7. >*

### 4.2 Application Schema <S-100 Part 3>

*<Normally, the full application schema is described in this section. It can be described using UML, however, for specifications that have large application schemas it can also be realised in the feature catalogue and the product specification can contain specific examples.>*

## 5 Feature Catalogue <S-100 Part 5>

### 5.1 Introduction

*<The S-1XX Feature Catalogue describes the feature types, information types, attributes, attribute values, associations and roles which may be used in the product.*

*The S-1XX 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 website.*

*Note, for Imagery and Gridded Data, a coverage is a type of feature so a product specification may not contain a “catalogue” with the exception of the environmental parameter the dataset models. Therefore much of this clause may be irrelevant. >*

## 5.2 Feature Types

*<The following clauses describe the different feature types that may be used in the feature catalogue.>*

### 5.2.1 Geographic

*<Geographic (geo) feature types form the principle content of the dataset and are fully defined by their associated attributes and information types.>*

### 5.2.2 Meta

*<Meta features contain information about other features within a data set. Information defined by meta features override the default metadata values defined by the data set descriptive records.*

*Meta features must be used to their maximum extent to reduce meta attribution on individual features.>*

## 5.3 Feature Relationship

*<A feature relationship links instances of one feature type with instances of the same or a different feature type. There are three common types of feature relationship: Association, Aggregation and Composition >*

## 5.4 Information Types

*<Information types are identifiable pieces of information in a dataset that can be shared between other features. They have attributes but have no relationship to any geometry; information types may reference other information types.>*

## 5.5 Attributes

*<The following clauses specify the different types of attributes that may be used in a product specification. They may be either simple or complex.>*

### 5.5.1 Simple Attributes

*< The following table is an example of the different types of simple attributes. The content should be drawn from Tables 1-2 (Data types) and 1-4 (Predefined derived types) in S-100 Part 1. The Definition, especially any examples, should correspond to the data format – products using the XML format must use the XML representations described in S-100 Table 1-2. Product Specification authors should note that the example below does not list all the types defined in S-100. Types not used in the Product Specification need not be listed.>*

Type	Definition
Enumeration	A fixed list of valid identifiers of named literal values
Boolean	A value representing binary logic. The value can be either <i>True</i> or <i>False</i> . The default state for Boolean type attributes (that is, where the attribute is not populated for the feature) is <i>False</i> .

Real	A signed Real (floating point) number consisting of a mantissa and an exponent
Integer	A signed integer number. The representation of an integer is encapsulation and usage dependent.
CharacterString	An arbitrary-length sequence of characters including accents and special characters from a repertoire of one of the adopted character sets
Date	<p>A date provides values for year, month and day according to the Gregorian Calendar.</p> <p><i>&lt;For ISO 8211 products:&gt;</i></p> <p>Character encoding of a date is a string which must follow the calendar date format (complete representation, basic format) for date specified by ISO 8601:1988.</p> <p>EXAMPLE 19980918 (YYYYMMDD)</p> <p><i>&lt;For XML/GML products&gt;</i></p> <p>Character encoding of a date in S-1XX is a string which must conform to the XML Schema standard type instead of the ISO 8601 basic representation (which is not a standard type in XML).</p> <p>EXAMPLE 18:30:59Z; 18:30:59+01:00; 18:30:59</p>
Time	<p>A time is given by an hour, minute and second. Character encoding of a time is a string that follows the local time (complete representation, basic format) format defined in ISO 8601:1988.</p> <p>EXAMPLE 183059 or 183059+0100 or 183059Z</p> <p><i>&lt;Adapt for XML/GML products as for Date above.&gt;</i></p>
DateTime	<p>A DateTime is a combination of a date and a time type. Character encoding of a DateTime must follow ISO 8601:1988</p> <p>EXAMPLE 19850412T101530</p> <p><i>&lt;Adapt for XML/GML products as for Date above.&gt;</i></p>

## 6 Datasets

### 6.1 Dataset Types

#### 6.1.1 Introduction

*<There is the capability to have different types of datasets, typically they are classified as complete, scale dependent and scale independent. Most products that are designed to be used with an ENC will be of a complete nature – where it contains the information needed to form a complete picture.>*

### 6.2 Dataset Loading and Unloading

*<This section is needed only if the data product has datasets that have coverages at multiple scales for a geographic area or provide datasets of different scales for the same geographic area. >*

<This section should consist of a statement about using the S-98 loading strategy (required for data products intended for ECDIS) or define a product-specific loading and unloading strategy. S-98 Appendix E (Dataset Loading and Display (Rendering) Algorithms) may be used as a guide if a product-specific loading strategy is defined.>

### 6.3 Geometry <S-100 Part 7>

<Geometric representation is the digital description of the spatial component of an object as described in S-100 and ISO 19107. Specify which S-100 Level of Geometry is to be used in the product specification.>

<Additional clauses 6.X describing other aspects of datasets, such as rules for overlaps, scale ranges, coverages and extents of meta-features, size limits, etc.>

## 7 Coordinate Reference Systems (CRS) <S-100 Part 6>

<This clause specifies the type of Coordinate Reference System used in the product.>

### 7.1 Introduction

<Optional brief overview of the use of coordinate reference systems in the data product. Describe also any special circumstances which apply. For example, S-101 Edition 2.0.0 contains a requirement for an ENC dataset to define at least one compound CRS and defines certain exclusions from the scope of the vertical CRS specified in this clause.>

### 7.2 Horizontal coordinate reference system

<An optional list or description of permitted coordinate reference system codes may be included here (for example, EPSG 4326, EPSG:32601 – EPSG:32660, EPSG:32701 – EPSG:32760).>

<A partially filled template for specifying the horizontal CRS follows.>

**Coordinate Reference System:**

**Datum:**

**Projection:** None / UTM / UPS <remove inapplicable projections>

**Horizontal Units:**

**Coordinate Reference System Registry:** EPSG Geodetic Parameter Registry

**Date type (according to ISO 19115-1):** 002 - publication

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

**URL:** <https://epsg.org>

### 7.3 Projection

<Statement about whether the data are projected or unprojected.>

### 7.4 Vertical coordinate reference system

<Describe the vertical CRS and permitted vertical datum(s).>

## 7.5 Temporal reference system

*<The temporal reference system will generally be the Gregorian calendar for dates. If the Product Specification mandates the use of UTC for all time values, that may also be stated here.>*

## 8 Data Quality

*<The data quality overview element should include at least the intended purpose and statement of quality or lineage. Other data quality elements cover: completeness, logical consistency, positional accuracy, temporal accuracy, thematic accuracy, and anything specifically required for the product being specified. The text recommended by the DQWG is in S-97 Part C, which also contains a hypothetical example.>*

### 8.1 Introduction to data quality

*<text from S-97 Part C template, customized as necessary>*

### 8.2 Completeness

*<text from S-97 Part C template, customized as necessary>*

#### 8.2.1 Commission

*<text from S-97 Part C template, customized as necessary>*

#### 8.2.2 Omission

*<text from S-97 Part C template, customized as necessary>*

#### **<Clauses 6.X, 6.Y, etc.>**

*<Include clauses for other quality elements as specified in the S-97 Part C template.>*

*<The heading styles for this and the quality measures clause should be changed to the appropriate styles for the Product Specification>*

#### **<Clause 6.X – Quality measure element>**

The data quality measures recommended in S-97 (Part C) and their applicability in **S-1XX** are indicated in Table 6-1 below. NA indicates the measure is not applicable.

*<The “Scope in S-1XX” column should describe the scope of the quality measure, either a named scope identified in S-1xx, or a descriptive scope such as “whole dataset”, “features with surface geometry”, “Feature types X, Y, and Z”, etc.>*

Table 8-1 – IHO recommended quality elements and their relevance to **S-1XX**

No.	Data quality element and sub element	Definition	DQ measure / description	Evaluation scope	Scope in <b>S-1XX</b>
1	Completeness / Commission	Excess data present in a dataset, as described by the scope.	numberOfExcessItems / This data quality measure indicates the number of items in the dataset, that should not have been present in the dataset.	dataset / dataset series	<i>&lt;scope of quality measure&gt;</i>

No.	Data quality element and sub element	Definition	DQ measure / description	Evaluation scope	Scope in S-1XX
<Etc., etc. Data quality elements listed in S-97 Part C that are inapplicable for the Product Specification may either be omitted from the table or included with "NA" in the Scope column. If omitted, a note listing the omitted elements and stating they were intentionally omitted is recommended.>					

## 9 Data Capture and Classification

<The data product specification must provide information on how the data is to be captured. This should be as detailed and specific as necessary. If the DCEG is provided as a Annex this clause may consist only of a statement to this effect, for example:

The S-1XX Data Classification and Encoding Guide (DCEG) describes how data describing the real world should be captured using the types defined in the S-1XX Feature Catalogue. This Guide is provided as Annex <annex number>.

>

## 10 Maintenance

<This clause describes the requirement to adequately maintain datasets; use of newly acquired source data; maintenance requirements within the overall production process; how Feature and Portrayal Catalogues are to be managed; and provision of maintenance-related metadata with exchange sets.>

### 10.1 Introduction

<Provide an overview of maintenance requirements, considerations, and practices>

### 10.2 Maintenance and update frequency

<Specify the maintenance and update frequency (which may be "as needed")>

### 10.3 Data source

<Provide a brief overview of sources for updating datasets>

### 10.4 Production process

<Describe production processes>

### 10.5 Dataset updates

<Describe criteria and practices for new datasets, new editions, reissues, cancellations, etc. For cancellations, specify whether file-based or fileless cancellation is used.>

### 10.6 Support file management

<Describe how support files are updated, added, or cancelled.>

### 10.7 Feature and portrayal catalogue management

<Describe how updated feature and portrayal catalogues are produced and distributed>

## 10.8 Metadata related to dataset maintenance

*<Describe any requirements for exchange catalogue metadata for new datasets, new editions, reissues, cancellations, etc. (all the types of datasets permitted by this Product Specification).>*

## 11 Portrayal <S-100 Part 9>

*<If portrayal is not required for the data product, or a portrayal catalogue is not defined for this edition of the Product Specification, a statement to that effect should be included here and the sub-clauses below omitted.>*

### 11.1 Introduction

*<Introduction to portrayal for this data product, for example, intended use scenarios and platforms (e.g., ECDIS) and principles.>*

### 11.2 Portrayal Catalogue

*<Citation for the portrayal catalogue.>*

No.	ISO class or attribute	Type	Value
--	CI_Citation	Class	--
1	title	CharacterString	<i>&lt;title of PC&gt;</i>
2	date	CI_Date (class)	--
2.1	date	DateTime	<i>&lt;of publication&gt;</i>
2.2	dateType	CI_DateTypeCode (ISO codelist)	<i>&lt;value from codelist&gt;</i>
3	edition	CharacterString	<i>&lt;edition of PC&gt;</i>
4	editionDate	DateTime	<i>&lt;of PC edition&gt;</i>
5	citedResponsibleParty	CI_Responsibility (class)	--
5.1	role	CI_RoleCode (ISO codelist)	<i>&lt;value from codelist&gt;</i>
5.2	party	CI_Organisation (class)	--
5.2.1	name	CharacterString	<i>&lt;name of organisation&gt;</i>
6	otherCitationDetails	CharacterString	<i>&lt;other details, e.g., build date as YYYYMMDD, or "most recent build"&gt;</i>
7	onlineResource	CI_OnlineResource (class)	--
7.1	linkage	CharacterString (URL)	<i>&lt;location where portrayal catalogue can be obtained&gt;</i>
7.2	name	CharacterString	S-1XX Portrayal Catalogue
7.3	description	CharacterString	XML Portrayal Catalogue accompanied by related files for symbols, colour profiles, rules, etc

### 11.3 Portrayal requirements and principles

*<Any rules governing portrayal which developers should be aware of, for example, scaling, thinning, etc. It is not necessary to repeat “portrayal rules” as described in S-100 Part 9 in this section.>*

## 12 Data Product format (encoding) **<S-100 Part 10>**

### 12.1 Introduction

*<This clause specifies the encoding for S-1XX datasets. If one of the data formats defined in S-100 Part 10a/b/c is being used the Part should be indicated. If a format not defined in S-100 is used the Product Specification must specify it by reference to its defining standard and/or to the component of the Product Specification (Annex, clause, etc.) which describes the format.>*

**Format Name:**

**Version:**

**Character Set:**

**Specification:**

### 12.2 Dataset structure

*<Any required order for objects within a dataset, or any hierarchical structure within a dataset, should be explained here. For example, vector data products may specify a relative ordering of features, information types, and spatial objects, or Product Specifications for HDF-5 products may explain the hierarchical structure of their HDF-5 datasets.>*

### 12.3 Encoding of codelists

*<If the Application Schema includes codelists, the format for the chosen type(s) of codelists should be explained here. The format must conform to the format guidance in S-100 and S-97, which must be treated as normative for the purposes of Product Specifications. This guidance is provided in S-100 Appendix 11-C and will be transferred to S-97 Edition 2.0.0. (The content of this Appendix has been removed from S-100 Edition 5.2.1 in anticipation of S-97 Edition 2.0.0.)>*

*<Additional clauses 12.X describing other aspects of the data product format.>*

## 13 Data Product Delivery

### 13.1 Introduction

*<This clause specifies the delivery mechanisms for datasets. >*

**Units of Delivery:**

**Transfer Size:**

**Medium Name:**

**Other Delivery Information:**

## 13.2 Dataset

### 13.2.1 Datasets

*<Specify the types of datasets (New Edition, Update, Re-issue)>*

#### 13.2.1.1 Dataset size

*<Specify the maximum dataset size>*

#### 13.2.2 Dataset file naming

*<Specify the dataset naming convention>*

## 13.3 Support Files

*<Specify if the product will utilize support files>*

### 13.3.1 Support File Naming

*<Specify if naming convention for support files>*

## 13.4 Exchange Catalogue and Delivery Packaging

*<Specify if the datasets will be part of an exchange set and accompanied by an exchange catalogue. The structure and form(s) which the delivery packages are expected to take (e.g., zip archives) may also be described here. Typical sub-heads in this clause are listed below >*

- Dataset packaging *<E.g., archive format, delivery method>*
- Exchange Sets *<Explain exchange set structure, which should be based on the structure described S-100 Part 17 clause 17-4.2 omitting components not used by the Product Specification.>*
- Exchange catalogue *<Statement about the necessity of exchange catalogue (required for exchange sets), its name (CATALOG.XML) and conformance to the S-100 exchange catalogue format, location of schema and/or product-specific validation support, e.g., availability of validation software.>*

## 14 Metadata **<S-100 Part 17>**

*<The Metadata clause should consist of one or more introductory clauses providing an overview of the exchange catalogue for S-1XX followed by clauses specifying the requirements for exchange catalogues and discovery metadata in S-1XX exchange catalogues, especially product-specific restrictions on the classes and attributes described in S-100.>*

### 14.1 Introduction

*<One or more introductory clauses providing an overview of the exchange catalogue for S-1XX. Include an overview of any significant differences from the exchange catalogue elements described in S-100 Part 17. For example, if the product specification does not permit support files and therefore does not use the class S100\_SupportFileDiscoveryMetadata, this should be mentioned in the overview. An example follows. Product Specification developers should customize the example for their own data products or substitute their own description.>*

## 12.1. Introduction

S-100 provides for supplying the following categories of metadata with S-100 based Exchange Sets:

- Metadata about the overall Exchange Set and the Exchange Catalogue;
- Discovery metadata about each of the datasets contained in the Exchange Set; and
- Discovery metadata about the support files that make up the package;
- Metadata about any Feature, Portrayal, or Interoperability Catalogues included in the Exchange Set.

In an S-100 Exchange Set, the above metadata is provided by the Exchange Catalogue, which is an XML file containing XML blocks describing discovery metadata for the exchange set and its components.

The discovery metadata classes described in S-100 Part 17 have numerous attributes which enable important information about the datasets and accompanying support files to be examined without the need to process the data, for example, decrypt, decompress, load, etc. S-100 Figure 17-2 depicts the conceptual structure of an S-100 Exchange Set and the relationships between components of the Exchange Set and discovery metadata in the Exchange Catalogue. The Exchange Catalogue is structured as depicted in S-100 Figures 17-6 and 17-7. Detailed specifications for metadata are provided in S-100 clause 17-4.5.

This edition of S-1XX implements the metadata structure and encoding defined in S-100 Edition 5.2.1 Part 17. This Edition of S-1XX does not include a Portrayal Catalogue, does not use ISO metadata files, and does not provide for S-130 datasets to reference support files. The optional discovery metadata which S-100 Part 17 provides for portrayal catalogues and ISO metadata files are therefore not permitted for S-1XX data.

Clause 12.2 provides details about the mandatory and optional metadata for S-1XX.

## 14.2 Elements of S-1XX Exchange Catalogues

### 12.2. Elements of S-1XX Exchange Catalogues

S-1XX metadata in Exchange Catalogues is derived from S-100 Part 17, Figure 17-7, with the following restrictions:

- S-1XX does not use certain optional elements and fields defined in S-100 generic metadata. Elements that are optional in the generic S-100 catalogue model but not used in S-130 are not shown.
- S-1XX makes certain optional S-100 elements or fields mandatory. Elements that are optional in S-100 but mandatory in S-130 are shown with the restricted multiplicity in place of that given in S-100 Part 17 (for example, as “1” instead of the generic “0..1”) and the restriction is noted in the Remarks column.
- S-1XX imposes certain product-specific requirements on the values of some metadata fields. These requirements are described in the Remarks column.
- In S-1XX Edition 2.0.0 the only catalogues defined for S-1XX products are Feature Catalogues.

The default language used by the Exchange Catalogue may be specified in the defaultLocale field of S100\_ExchangeCatalogue (clause 0). If omitted, the default language is English. See

S-100 Part 17, clauses 17-4.6 – 17-4.8 for guidance on encoding of metadata in languages other than English.

The following clauses define the mandatory and optional metadata used by S-1XX. Differences from generic S-100 metadata are emphasized for developer convenience in bold text in the documentation tables, and comments noting the difference are included in the Remarks column. Where S-1XX does not impose any restrictions on the S-100 class, the corresponding documentation table has been omitted from this document.

Figure 12-1 below depicts the detailed structure of the S-130 Exchange Catalogue. This Figure is derived from S-100 Part 17, Figure 17-7, modified to omit elements (classes, attributes, and enumeration values) that are optional in the generic S-100 catalogue model and not used in S-1XX.

*<The UML diagram from Part 17 depicting metadata classes may be included at Project Team discretion. If included, it may be customized to apply product-specific restrictions; if the diagram from S-100 Part 17 is reproduced as is, a note should be added saying that product-specific changes are not depicted.>*

*<S-100 metadata classes and attributes used in the Product Specification must be documented. The classes and attributes may be documented by reference to S-100 Part 17 or in the form of documentation tables for all permitted classes, each listing all the permitted attributes and roles for each class. If there are no product-specific restrictions for a class, the table may be omitted and replaced by a statement that the S-100 class is used without product-specific restrictions. Whichever form is used, any product-specific restrictions on S-100 classes and attributes must be specified, including restrictions on multiplicity and values. It is strongly recommended that the documentation include specific statements regarding any S-100 elements which are not used in the Product Specification. Examples are included for S100\_ExchangeCatalogue and S100\_DiscoveryMetadata below.>*

***<Since the S-100 WG may have revised Part 17 after preparation of this edition of S-97, Product Specification developers must use the elements and tables from the current edition of S-100 as a starting point and either compare the tables below with S-100 or replace them with the S-100 tables modified with product-specific restrictions and annotations.>***

***<Differences from S-100 should be emphasized so that they stand out to the reader, for example by using bold font in red colour for differences.>***

### 14.2.1 S100\_ExchangeCatalogue

S-1XX uses the S100\_ExchangeCatalogue class with additional restrictions and constraints as described below.

Name	Description	Mult	Type	Remarks
S100_ExchangeCatalogue	An Exchange Catalogue contains the discovery metadata about the exchange datasets and support files	-	-	-
identifier	Uniquely identifies this Exchange Catalogue	1	S100_ExchangeCataloguelden tifier	0..1 multiplicity in S-100 restricted to 1 in S-1XX
contact	Details about the issuer of this Exchange Catalogue	1	S100_CataloguePointOfConta ct	0..1 multiplicity in S-100 restricted to 1 in S-1XX
productSpecification	Details about the Product Specifications used for the datasets contained in the Exchange Catalogue	1..*	S100_ProductSpecification	0..* multiplicity in S-100 restricted to 1..* in S-1XX
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
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
exchangeCatalogueDescription	Description of what the Exchange Catalogue contains	0..1	CharacterString	
exchangeCatalogueComment	Any additional Information	0..1	CharacterString	
certificates	Signed public key certificates referred to by digital signatures in the Exchange Set	0..*	S100_SE_CertificateContainer Type	Content defined in S-100 Part 15. All certificates used, except the SA root certificate (installed separately by the implementing system) shall be included
dataServerIdentifier	Identifies the data server for the permit	0..1	CharacterString	
datasetDiscoveryMetadata	Exchange Catalogues may include or reference discovery metadata for the datasets in the Exchange Set	0..*	Aggregation S100_DatasetDiscoveryMetad ata	

catalogueDiscoveryMetadata	Metadata for Catalogue	0..*	Aggregation S100_CatalogueDiscoveryMetadata	Metadata for the Feature, Portrayal and Interoperability Catalogues, if any
supportFileDiscoveryMetadata	Exchange Catalogues may include or reference discovery metadata for the support files in the Exchange Set	0..*	Aggregation S100_SupportFileDiscoveryMetadata	

<Optional notes, e.g., rules for defining identifier attribute.>

#### 14.2.1.1 S100\_CatalogueIdentifier

S-1XX uses S100\_ExchangeCatalogueIdentifier without modification. <or “S-1XX restricts the multiplicity and contents of S100\_CatalogueIdentifier as described in the table below”>

<Optional table. Recommended if S-1XX has product-specific requirements.>

<Optional notes.>

#### 14.2.1.2 S100\_CataloguePointofContact

S-1XX uses S100\_CataloguePointOfContact without modification. <or “S-1XX restricts the multiplicity and contents of S100\_CataloguePointOfContact as described in the table below”>

<Optional table. Recommended if S-1XX has product-specific requirements.>

<Optional notes.>

#### 14.2.2 S100\_DatasetDiscoveryMetadata

S-1XX restricts the multiplicity and contents of S100\_DatasetDiscoveryMetadata as described in the table below.

Dataset discovery metadata for an update dataset also uses S100\_DatasetDiscoveryMetadata. Update dataset metadata is intended to describe information about an update dataset. It facilitates the management and exploitation of data and is an important requirement for understanding the characteristics of an update dataset. Whereas dataset metadata is usually fairly comprehensive, metadata for update datasets only describe the issue date and sequential relation to the base dataset. Optional fields may therefore be omitted for update metadata unless mandated in the Remarks column.

Name	Description	Mult	Type	Remarks
S100_DatasetDiscoveryMetadata	Metadata about the individual datasets in the Exchange Catalogue	-	-	<p>The optional S-100 attributes <i>navigationPurpose</i>, <i>temporalExtent</i> and <i>approximateGridResolution</i> are prohibited in S-1XX.</p> <p>The optional S-100 attributes <i>dataCoverage</i> and <i>editionNumber</i> are mandatory in S-1XX</p>
fileName	Dataset file name	1	URI	See S-100 Part 1, clause 1-4.6
description	Short description giving the area or location covered by the dataset	0..1	CharacterString	<p>For example a harbour or port name, between two named locations etc.</p> <p>For an update dataset this field should contain a brief description of the update.</p>
datasetID	Dataset ID expressed as a Maritime Resource Name	0..1	URN	The URN must be an MRN
compressionFlag	Indicates if the resource is compressed	1	Boolean	<p><i>true</i> indicates a compressed dataset resource</p> <p><i>false</i> indicates an uncompressed dataset resource</p>
dataProtection	Indicates if the data is encrypted	1	Boolean	<p><i>true</i> indicates an encrypted dataset resource</p> <p><i>false</i> indicates an unencrypted dataset resources</p>
protectionScheme	Specification of method used for data protection	0..1	S100_ProtectionScheme	In S-100 the only allowed value is "S100p15"
digitalSignatureReference	Specifies the algorithm used to compute digitalSignatureValue	1	S100_SE_DigitalSignatureReference (see S-100 Part 15)	Signatures are mandatory in S-100 Edition 5.2.0/5.2.1

Name	Description	Mult	Type	Remarks
digitalSignatureValue	Value derived from the digital signature	1..*	S100_SE_DigitalSignature (see S-100 Part 15)	The value resulting from application of <i>digitalSignatureReference</i> Implemented as the digital signature format specified in Part 15 <b>At least one S100_SE_SignatureOnData is required. All S100_SE_SignatureOnData elements must include dataStatus and certificateRef XML attributes.</b> <b>There must be at least one signature for the dataset file in the form (encrypted, compressed, or unencrypted and uncompressed) in which it is included in the exchange set.</b>
copyright	Indicates if the dataset is copyrighted	1	Boolean	<i>true</i> indicates the resource is copyrighted <i>false</i> Indicates the resource is not copyrighted For an update dataset the value must be the same as the base dataset
classification	Indicates the security classification of the dataset	0..1	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 For an update dataset the value must be the same as the base dataset
purpose	The purpose for which the dataset has been issued	0..1	S100_Purpose	
notForNavigation	Indicates the dataset is not intended to be used for navigation	1	Boolean	<i>true</i> indicates the dataset is not intended to be used for navigation <i>false</i> indicates the dataset is intended to be used for navigation <b>S-1XX permits only the value <i>true</i>.</b>
specificUsage	The use for which the dataset is intended	0..1	MD_USAGE>specificUsage (character string)	Information about specific usage(s) for which the dataset is intended

Name	Description	Mult	Type	Remarks
editionNumber	The Edition number of the dataset	1	PositiveInteger	<b>Mandatory in S-1XX</b> <b>For an update dataset the value must be the same as the base dataset</b>
updateNumber	Update number assigned to the dataset and increased by one for each subsequent update	1	Integer	Update number 0 is assigned to a new dataset <b>Mandatory in S-1XX</b> <b>For an update dataset the update sequence number, must match file name</b>
updateApplicationDate	This date is only used for the base cell files (that is new data set, re-issue and new edition), not update cell files. All updates dated on or before this date must have been applied by the producer	0..1	Date	
referenceID	Reference back to the datasetID	0..1	URN	In update metadata refers to the datasetID of the dataset metadata. This is used if and only if the dataset is an update The URN must be an MRN
issueDate	Date on which the data was made available by the Data Producer	1	Date	<b>The date on which the dataset was generated.</b> <b>For an update dataset, this must be on or after the issue date of the base dataset and the most recent previous update</b>
issueTime	Time of day at which the data was made available by the Data Producer	0..1	Time	
boundingBox	The extent of the dataset limits	0..1	EX_GeographicBoundingBox	<b>Not used for update datasets.</b>
productSpecification	The product specification used to create this dataset	1	S100_ProductSpecification	
producingAgency	Agency responsible for producing the data	1	CI_ResponsibleParty>CI_Organisation	See S-100 Part 17
producerCode	The official IHO Producer Code from S-62	0..1	CharacterString	<b>Recommended for S-1XX datasets</b>
encodingFormat	The encoding format of the dataset	1	S100_EncodingFormat	<b>Must be GML</b>
dataCoverage	Area covered by the dataset	1..*	S100_DataCoverage	<b>Mandatory in S-1XX</b> <b>For an update, must be the same as the base dataset.</b>

Name	Description	Mult	Type	Remarks
comment	Any additional information	0..1	CharacterString	
defaultLocale	Default language and character set used in the dataset	0..1	PT_Locale	If omitted the language must be English, UTF-8
otherLocale	Other languages and character sets used in the dataset	0..*	PT_Locale	
metadataPointOfContact	Point of contact for metadata	0..1	CI_Responsibility > CI_Individual or CI_Responsibility > CI_Organisation	Only if metadataPointOfContact is different from producingAgency
metadataTimeStamp	Date stamp for metadata	0..1	Date	May or may not be the issue date
replacedData	Indicates if a cancelled dataset is replaced by another data file(s)	0..1	Boolean	<b>Mandatory when purpose = cancellation</b>
dataReplacement	Dataset name	0..*	CharacterString	A dataset may be replaced by 1 or more datasets <b>Mandatory when replacedData = true</b>
resourceMaintenance	Information about the frequency of resource updates, and the scope of those updates	0..1	MD_MaintenanceInformation	S-100 restricts the multiplicity to 0..1 and adds specific restrictions on the ISO 19115 structure and content. See clause <b>MD_MaintenanceInformation</b> in S-100 Part 17 Format: PnYnMnDTnHnMnS (XML built-in type for ISO 8601 duration). See S-100 Part 17, clause 17-4.9 for encoding guidance

#### 14.2.2.1 S100\_NavigationPurpose

<Statement of use or non-use, restriction or non-restriction and optional table as described previously Example table below showing how non-use of an S-100 value may be indicated.>

Item	Name	Description	Code	Remarks
Enumeration	S100_NavigationPurpose	The navigational purpose of the dataset	-	<b>S-1XX prohibits the “overview” value.</b>
Value	port	For port and near shore operations	1	-
Value	transit	For coast and planning purposes	2	-

#### **14.2.2.2 S100\_DataCoverage**

*<Statement of use or non-use, restriction or non-restriction, optional table and optional notes as described previously.>*

NOTE: boundingPolygon is restricted to a single GML Polygon with one exterior and 0 or more interiors expressed as Linear Rings using SRS EPSG:4326. The exterior and optional interiors shall be composed of a closed sequence of >=4 coordinate positions expressed individually or as a list (posList). The GML polygon shall have a valid GML identifier.

#### **14.2.2.3 S100\_Purpose**

*<Statement of use or non-use, restriction or non-restriction, optional table and optional notes as described previously.>*

#### **14.2.2.4 S100\_TemporalExtent**

*<Statement of use or non-use, restriction or non-restriction, optional table and optional notes as described previously.>*

#### **14.2.2.5 S100\_EncodingFormat**

*<Statement of use or non-use, restriction or non-restriction, optional table and optional notes as described previously.>*

#### **14.2.2.6 S100\_ProductSpecification**

*<Statement of use or non-use, restriction or non-restriction, optional table and optional notes as described previously.>*

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

*<Statement of use or non-use, restriction or non-restriction, optional table and optional notes as described previously.>*

#### **14.2.2.7 S100\_ProtectionScheme**

*<Statement of use or non-use, restriction or non-restriction, optional table and optional notes as described previously.>*

#### **14.2.2.8 MD\_MaintenanceInformation**

*<Statement of use or non-use, restriction or non-restriction, optional table and optional notes as described previously. Note that any product-specific restrictions will be in addition to the restrictions S-100 imposes on the ISO type.>*

#### **14.2.2.9 MD\_MaintenanceFrequencyCode**

*<Statement of use or non-use, restriction or non-restriction, optional table and optional notes as described previously. Note that any product-specific restrictions will be in addition to the restrictions S-100 imposes on the ISO type >*

#### **14.2.2.10 S100\_SE\_DigitalSignatureReference**

S-130 uses only the ECDSA-384-SHA2 value of S100\_SE\_DigitalSignatureReference, in conformity with the restriction in S-100 Part 15, clauses 15-8.7 and 15-8.11.7.

Item	Name	Description	Code	Remarks
Enumeration	S100_SE_DigitalSignatureReference	Algorithm used to compute the digital signature	-	Only ECDSA is currently used in implementations of S-100 for file based transfer of data to ECDIS. Other values are included for interoperability with other implementations by external standards. See S-100 Part 15, clause 15-8.4
Value	ECDSA-384-SHA2		8	384 bits ECDSA: SHA2-384

#### **14.2.2.11 S100\_SE\_DigitalSignature**

S-130 conforms to S-100 Part 15, clause 15-8-11.4, which states: "The class S100\_SE\_DigitalSignature is realized as one of either S100\_SE\_SignatureOnData (a digital signature of a particular identified resource) or an additional digital signature defined using the [same class] which is either a S100\_SE\_SignatureOnData or S100\_SE\_SignatureOnSignature element as described in clause 15-8.8. S-100 Part 17 metadata thus allows for multiple digital signatures, a single mandatory S100\_SE\_SignatureOnData and any number of additional signatures, either of the data or other signatures." (In S-100, this class is not documented separately.)

S-130 uses the class S100\_SE\_DigitalSignature without modification; however, in S-100 exchange catalogues it is implemented by one of its subclasses S100\_SE\_SignatureOnData or S100\_SE\_SignatureOnSignature.

#### **14.2.2.12 S100\_SE\_SignatureOnData**

*<Statement of use or non-use, restriction or non-restriction, optional table and optional notes as described previously.>*

#### **14.2.2.13 S100\_SE\_SignatureOnSignature**

*<Statement of use or non-use, restriction or non-restriction, optional table and optional notes as described previously>*

#### 14.2.2.14 DataStatus

*<Statement of use or non-use, restriction or non-restriction, optional table and optional notes as described previously.>*

#### 14.2.2.15 EX\_GeographicBoundingBox

S-1XX uses the ISO class with only the four attributes specifying the lower left and upper right corners. The ISO extentTypeCode attribute is omitted.

NOTE (from ISO 19115-1): This is only an approximate reference so specifying the Coordinate Reference System is unnecessary and need only be provided with a precision of up to two decimal places.

#### 14.2.2.16 EX\_BoundingPolygon

S-1XX uses the ISO class with only the polygon attribute. The ISO extentTypeCode attribute is omitted.

NOTE (from ISO 19115-1): If a polygon is used it should be closed (last point replicates first point).

### 14.2.3 S100\_SupportFileDiscoveryMetadata

*<Statement of use or non-use, restriction or non-restriction, optional table and optional notes as described previously.>*

#### 14.2.3.1 S100\_SupportFileFormat

*<Statement of use or non-use, restriction or non-restriction, optional table and optional notes as described previously.>*

#### 14.2.3.2 S100\_SupportFileRevisionStatus

*<Statement of use or non-use, restriction or non-restriction, optional table and optional notes as described previously.>*

#### 14.2.3.3 S100\_SupportFileSpecification

*<Statement of use or non-use, restriction or non-restriction, optional table and optional notes as described previously.>*

#### 14.2.3.4 S100\_ResourcePurpose

*<Statement of use or non-use, restriction or non-restriction, optional table and optional notes as described previously.>*

#### **14.2.4 S100\_CatalogueDiscoveryMetadata**

*<Statement of use or non-use, restriction or non-restriction, optional table and optional notes as described previously.>*

##### **14.2.4.1 S100\_CatalogueScope**

*<Statement of use or non-use, restriction or non-restriction, optional table and optional notes as described previously.>*

#### **14.2.5 PT\_Locale**

S-130 uses the ISO class PT\_Locale with the restrictions defined in S-100.

*<Place where the codelists for the types LanguageCode, CountryCode and MD\_CharacterSetCode are to be found. These types are defined in resource files within the S-100 XML schemas package and described in the documentation for the S-100 XML Schemas. Product Specifications may choose to deliver them as support files in a special exchange set or require application developers to provide them (or equivalents) in application software.>*

#### **14.2.6 S100\_SE\_CertificateContainer**

*<Statement of use or non-use, restriction or non-restriction, optional table and optional notes as described previously.>*

## 14.3 Language

*<Specify the language to be used>*

## 15 Carrier Metadata <S-100 Part 10c>

*<Since HDF-5 products include some metadata within the HDF5 dataset as described in S-100 Part 10c, Product Specifications should include information about product-specific restrictions of such metadata too. This may be provided as a separate clause or in another appropriate location in the Product Specification. The structure should be as follows:*

- *Introduction providing an overview of carrier metadata and an explanation of conventions or notations used by the Product Specification.*
- *Common rules and guidance*
- *Detailed specifications, including any restrictions on elements defined in S-100 Part 10c.*

*Diagrams depicting metadata are optional.>*

### 15.1 Introduction

*<The Introduction should provide an overview of carrier metadata, explain the conventions used by the Product Specification, and list common rules or guidance applying to metadata at all levels of the HDF5 dataset. A typical example is provided below. Product Specification developers may remove or add content, taking care to remain compliant with S-100 Part 10c.>*

The metadata for the S-1XX product is divided in three sections, corresponding to the General Metadata (Table X-1), the Feature Type Metadata (Table X-2), and the Feature Instance Metadata (Table X-3 and Table X-4). The Instance Metadata is subdivided into metadata attached to the instance as a whole (Table 12-3) and metadata attached to individual values groups (Table X-4). Since these values do not reside in the Metadata blocks in the Exchange Catalogue, but are in the HDF5 files, they are referred to as Carrier Metadata. The Carrier Metadata consists of the data and parameters needed to read and interpret the information in the <S-1XX> product even if the other S-1XX Metadata files are unavailable.

Note that in Tables X-1 – X-4, some of the metadata variables have restrictions on their core values (that is, whether they are optional or mandatory, the specific values allowed, etc) that are not imposed in S-100. These are grouped under the heading ‘Additional restrictions on core metadata for S-1XX’.

Mandatory attributes in a section of a Table that is designated for one or more specified dataCodingFormat values are mandatory only for the specified dataCodingFormat value(s).

It is suggested for any enumeration in S-104, to use unsigned integer types (preferably standard integer type H5T\_STD\_U8LE) for the base type of the numeric code when creating the enumeration.

The maximum length of all string HDF5 attributes is 300 characters.

For all carrier metadata, latitude and longitude values are precise to  $10^{-7}$  degrees except where noted. All times are in UTC format.

All enumeration attributes in carrier metadata must be implemented as HDF5 enumerations. The base type for all enumeration attributes in the following tables must be 8-bit unsigned integer in the HDF5 standard integer type H5T\_STD\_U8LE.

Integer types are signed integers unless designated as “unsigned”.

Strings must use UTF-8 character encoding. String padding is not specified in this edition of the Product Specification due to the diversity of API framework treatment of padding.

*<If figures are included, a paragraph describing the figures should be added.>*

## 15.2 General metadata

*<Provide details about metadata for the root group (see S-100 Part 10c), especially any restrictions or required values for fields defined in S-100. Explanatory notes should be added as needed.>*

*<A typical table and notes describing general metadata are included below,>*

No	Name	Camel Case	Mult	Data Type	Remarks and/or Units
1	Product Specification number and version	productSpecification	1	String	This must be encoded as ‘INT.IHO. <b>S-104</b> .X.Y’, with X representing the Edition number and Y the revision number. See Note 6
2	Date of data product issue	issueDate	1	String	Date must be consistent with issueDate in discovery metadata
<i>&lt;Attributes elided for brevity&gt;</i>					
24	Epoch of realization	epoch	0..1	String	Code denoting the epoch of the geodetic datum used by the CRS. For example, 2005.0 for the G1762 realization of the geodetic datum for WGS84. Must match epoch denoted by horizontalCRS.
<b>Additional metadata for S-104</b>					
25	Water level trend threshold	waterLevelTrendThreshold	1	Float 32-bit	Critical value used to determine steady water level trend. Units are metres/hour (m/hr). For example, 0.2. See Annex A (DCEG)
26	Dataset delivery interval	datasetDeliveryInterval	0..1	String	The expected time interval between availability of successive datasets for time-varying data. Must be formatted as PnYnMnDTnHnMnS (ISO 8601 duration). See Note 8
27	Trend Interval	trendInterval	0..1	Integer 32-bit unsigned	The interval over which trend at a particular time is calculated Unit: minutes
28	Vertical datum epoch	verticalDatumEpoch	0..1	String	The period / epoch when the vertical datum was computed
<b>Additional restrictions on core general metadata for S-104</b>					
29	Time of data product issue	issueTime	1	String	<b>Mandatory for S-104.</b> S-100 Time format. All times are in UTC. For example 123000Z
<i>&lt;Attributes elided&gt;</i>					

NOTE 1: The bounding box is the data set bounding box; the coverage data feature instances may or may not cover the entire bounding box. If there is only a single coverage feature, its extent may or may not be the same as the data set.

NOTE 2: Beginning S-100 Edition 5.0.0, class S100\_ProductSpecification (S-100 Part 17) contains a productIdentifier field whose value must be the Product ID value from the IHO Product Specification Register in the IHO Geospatial Information Registry. Attribute productSpecification in Table X-1 must use exactly the same value.

### 15.3 Feature Type metadata

No	Name	Camel Case	Mult	Data Type	Remarks and/or Units
1	Data organization index (Used to read the data.)	dataCodingFormat	1	Enumeration	<b>The allowed values are: 2: Regularly-gridded arrays</b> <b>This Product Specification allows the use of only value 2 from S-100</b>
2	Dimension	dimension	1	Integer, 8-bit unsigned	The (spatial) dimension of the feature instances. <b>Must be = 2</b> This is the number of coordinate axes, not the rank of the HDF5 arrays storing coordinates or values
<i>&lt;Attributes elided for brevity&gt;</i>					
<b>Additional metadata for S-104</b>					
8	Methodology	methodWaterLevelProduct	0..1	String	Brief description of tide gauge type, forecast method or model, etc
<i>&lt;Attributes elided&gt;</i>					
<b>Attributes for dataCodingFormat = 2 (regular Grid)</b>					
11	Sequencing Rule	sequencingRule.type	1	Enumeration	Method to be used to assign values from the sequence of values to the grid coordinates. Components: type: Enumeration CV_SequenceType <b>Must be 1 (for 'linear')</b>
12		sequencingRule.scanDirection	1	String	scanDirection: String <axisNames entry> (comma-separated). For example "latitude,longitude"
13	Interpolation Type	interpolationType	1	Enumeration	Interpolation method recommended for evaluation of the S100_GridCoverage Values: Only <i>nearestneighbor</i> is allowed from the values in the S-100 Part 8 enumeration S100_CV_InterpolationMethod. Note: This is not a recommendation for interpolation to be used by the data producer, but rather by an application reading S-104 data

No	Name	Camel Case	Mult	Data Type	Remarks and/or Units
14	Offset of data point in cell	dataOffsetCode	0..1	Enumeration	<p><b>Mandatory if data points are at grid cell centres.</b> See S-100 clauses 10c-9.6 and 8-5.2.8.</p> <p>The allowed values in S-104 are:</p> <ul style="list-style-type: none"> <li>1: XMin, YMin ("Lower left")</li> <li>5: Barycenter (centroid) of cell</li> </ul> <p>The default is "Lower left" and this attribute may be omitted if data points are at cell lower-left corners. Other cell corners are not allowed.</p>

## 15.4 Feature instance metadata

*<Include similar table and notes for feature instance metadata>*

## 15.5 Values group metadata

*<Include similar table and notes for values group metadata>*

## 15.6 Additional enumerations

*<Any enumerations used in general, feature type, feature instance, or values group metadata in the tables above must be specified here. Any restrictions on enumeration tables which are defined in S-100 Part 10c should also be described.>*

## Annex A. Data Classification and Encoding Guide

*<If the Application Schema consists of only a few features and attributes the DCEG may be an Annex to the Product Specification consisting of only the tables defining feature and information types, attributes, and associations. General practice to date (August 2025) has been to make the DCEG an Annex only for coverage data products (S-102, S-104, and S-111), since they generally define only one or two feature types and do not (as of August 2025) include associations or vector meta-features.>*

*<Much of the DCEG can be generated from the XML Feature Catalogue by the DCEG builder. Product Specification authors are cautioned to check such generated results for correctness and apply any necessary fixes manually before releasing a DCEG.>*

### 1 Overview

*<The Overview section is needed only if the DCEG is a separate document. The structure of the Overview section is given below.>*

#### 1.1 Preface (optional)

#### 1.2 Metadata that uniquely identifies the DCEG

#### 1.3 Terms, definitions, and abbreviations

#### 1.4 Use of language

#### 1.5 Maintenance

*<Describing the maintenance of the DCEG.>*

### 2 General

*<The General section is needed only if the DCEG is a separate document. The structure of the General section is given below.>*

#### 2.1 introduction

#### 2.2 Feature types

##### 2.2.1 Geographic feature class

##### 2.2.2 Meta feature class

#### 2.2 Information types

#### 2.3 Spatial primitives

##### 2.3.1 Capture density guideline

#### 2.4 Attributes

##### 2.4.1 Multiplicity

##### 2.4.2 Simple attribute types

##### 2.4.3 Mandatory and conditional attributes

##### 2.4.4 Missing attribute values

#### 2.4.5 Portrayal feature attributes

#### 2.4.6 Text attribute types

#### 2.4.7 Spatial attribute types

#### 2.4.8 Dates and Times

*<Rules for encoding dates and times, seasonal and time-dependent features, schedules, and other information involving dates and times.>*

#### 2.4.9 Feature identifier

*<Principles, rules, and conventions for the structure, generation and use of feature identifiers.>*

#### 2.4.10 Interoperability identifier (if used in data product)

#### 2.4.11 Encoding of codelist attributes (if used in data product)

*<If the data product uses codelist attributes, explain how the codelist attributes must be encoded. General guidance is provided in S-100 5.2.0 Appendix 11-C. (The content of this Appendix has been removed from S-100 Edition 5.2.1 in anticipation of S-97 Edition 2.0.0.)>*

### 2.5 Datasets

#### 2.5.1 Data coverage

#### 2.5.X <Other general or product-specific information for encoding data objects in datasets>

### 2.X Associations

*<Principles and rules for encoding associations; principles for encoding associations with attributes.>*

### 2.X <Other types of general information>

### 2.6 Description of table format for geo features and information types

*<The S-57 Acronym column and may be omitted at Product Specification author discretion. However automatically generated tables may include it by default and authors may find it more convenient to retain it.>*

*<The same table format should be used to describe information types, with appropriate changes (replace "FEATURE" with "INFORMATION TYPE", etc.)>*

*<Product Specification authors should note that the DCEG builder will generate tables for features, information types, attributes, associations, from the XML Feature Catalogue, and the generated structure may be different from the structures below, and furthermore, may evolve as the DCEG builder is updated and common conventions are developed. Separate information will be provided by the IHO Secretariat regarding the stability of the table format. In the interim, improvisations by Product Specification authors are permitted within reasonable limits. Product Specification authors are also cautioned to check generated tables for correctness, readability, and stylistic consistency and apply corrections as needed before publication of the DCEG.>*

IHO Definition: <b>FEATURE:</b> Definition. (Authority for definition). <i>&lt;Authority is optional&gt;</i>
--

<b>S-1XX Geo Feature: Feature Feature type name</b>				
<b>Primitives:</b> Point, Curve, Surface, Coverage, None Allowable geometric primitive(s)				
<b>Super-type:</b> <Super-type, if any. Should be populated if the feature catalogue includes super-type relationships.>				
<b>Sub-types:</b> <Optional list of sub-types. This row may be omitted or left blank, but the treatment should be consistent throughout the Product Specification>				
Real World Example(s) of real-world instance(s) of the Feature.		Paper Chart Symbol Example(s) of paper chart equivalent symbology for the Feature.	ECDIS Symbol Example(s) of ECDIS symbology for the Feature.	
S-1XX Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of beer		1 : ale 2 : lager 3 : porter 4 : stout 5 : pilsener 6 : bock beer 7 : wheat beer 8 : pale ale 9 : indian pale ale	EN	1,1
This section lists the full list of allowable attributes for the feature. Attributes are listed in alphabetical order. Sub-attributes (Type prefix (S)) of complex (Type C) attributes are listed in alphabetical order and indented directly under the entry for the complex attribute (see below for example). Note that a complex attribute may have simple or complex attributes as sub-complex attributes.	This section lists the corresponding S-57 attribute acronym. A blank cell indicates no corresponding S-57 acronym.	This section lists the allowable encoding values (for enumeration (E) Type attributes only).	Attribute type (see clause 2.4.2).	Multiplicity describes the "cardinality" of the attribute in regard to the feature. See clause 2.4.1.
fixed date range		See clause X.X	C	0,1
date end	(DATEND)		(S) TD	0,1
date start	(DATSTA)		(S) TD	0,1
information		See clause X.X	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFORM)		(S) TE	0,1
pictorial representation	(PICREP)	See clause X.X	TE	0,1
<b>Feature Associations</b>				
<Information associations should be described in a similar sub-table with the sub-title "Information Associations">				
S-130 Role	Association Type	Associated to	Type	Multiplicity

Role name (see clause 6.xx)	Name of Association (see clause 5.xx)	Feature or Information Type(s)	Association/Aggregation/Composition	0,1
See clause 6.	See clause 5.	Corresponds to the feature(s) that the subject feature may be associated to. See clause 5	Association type.	The individual multiplicity to which the subject feature may be associated to the "Associated to" feature(s) (see clause 5).

INT 1 Reference: The INT 1 location(s) of the Feature – by INT1 Section and Section Number. (Not applicable to S-130).

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

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

Specific instructions to encode the feature.

Remarks:

- Additional encoding guidance relevant to the feature.

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

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

Remarks:

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

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

Remarks: <Examples, should be edited and extended by Product Specification authors as needed>

- Indentation of attributes indicates sub-attributes of complex attributes. Complex attributes may also be sub-attributes of complex attributes, which is indicated by further indentation of the attribute name in the tables.
- Attributes shown in grey text are ECDIS "system" attributes which are populated by the ENC production system in order to assist with portrayal of ENC data in ECDIS (see Section 30). These attributes may be further edited by the compiler as required.
- S-57 Acronym: S-57 attribute acronyms for S-57 attributes remodelled in S-1XX are shown in italic style text.
- Allowable Encoding Value: For enumeration (EN) type attributes, the enumerate values listed are only those allowable for the particular binding of the attribute relevant to the feature. Allowable values may vary for the attribute depending on the feature to which the attribute is bound. Such bindings are defined in the S-1XX Feature Catalogue. The full list of enumerate values that may be assigned to an attribute in S-1XX can be found in Sections <X> and <Y> of this document.
- Type: The prefix (C) indicates that the attribute is a complex attribute. Complex attributes are aggregates of other attributes that can be simple type or complex type. The prefix (S) indicates that the attribute is a sub-attribute of a complex attribute. Complex attributes that are sub-attributes of a complex attribute, and their sub-attributes, are indicated by indentation of the attribute name in the S-1XX Attribute column.

## 3 Meta-features

### 4, 5, ... <Features and information types grouped by topic>

#### 4.1 Introduction

<If the application schema contains several features and information types, thematically similar types should be grouped into two or more clauses. Each such clause should contain an introductory section describing the theme and providing general directions for capturing real-world entities or information into the relevant types in the Application Schema, tabulations of features and common examples of coding, etc. The S-101 Edition 2.0.0 and S-131 Edition 1.0.0 DCEGs may be consulted for ideas about the kind of information that may be provided in the introductory section.>

### 4.2, 4.3, ... 5.2, 5.3, ... <Individual feature or information type>

<Table describing the feature or information type in the format described by the Product specification in the General section.>

## X Association names

Roles left blank in the tables are not encoded in the dataset, generally because they correspond to information-to-feature bindings, which are not permitted by the S-100 Feature Catalogue model.

The Role Type describes the type of binding (aggregation, association, or composition). This corresponds to the roleType attribute in a feature or information binding in the feature catalogue (see S-100 clauses 5-4.2.5.2 (Feature Bindings) and 5-4.2.5.3 (Information Bindings)). If the binding in that direction is not included in the feature catalogue (for the reason given in the previous paragraph), this cell too is left blank.

<u>IHO Definition:</u>				
<u>Remarks:</u>				
<ul style="list-style-type: none"> <li>&lt;Remarks if any, or "No remarks."&gt;</li> </ul>				
Role Type	Role	Association Name	Associated To	Multiplicity
Aggregation	<role>	<Association Name>	<target feature or information type>	0, *
Association	<role>	<Association Name>	<target feature or information type>	1, 1

## X Association roles

IHO Definition:

## X Attribute and enumeration descriptions

Attribute Name: IHO Definition:

**<code> Name**

IHO Definition:

**<code> Name**

IHO Definition:

Remarks:

- <Remarks or "No remarks">

**Attribute Name:** IHO Definition:

Unit: <if applicable>

Precision: <if applicable>

Format: <if applicable>

Minimum range: <if applicable>

Maximum range: <if applicable>

Range Closure: <if applicable>

Example: <optional, recommended for attributes with constraints>

Remarks: <optional>

- <Remarks or "No remarks.">

## X Complex attributes

IHO Definition:

Sub-attributes:

<**attribute 1**> (see clause <X>)

<**attribute 2**> (see clause <X>)

Remarks:

- <Remarks or "No remarks.">

## X System Attributes

<Attributes intended solely for "system" purposes (such as "portrayal" attributes) may be documented separately using the same formats as regular simple or complex attributes. The clause heading may be customised as appropriate.>

## X <Additional information>

<Information considered to be appropriate for the DCEG but not appropriate for any of the above sections may be included in additional clauses (with more descriptive headings than "additional

*information"). (See S-101 Edition 2.0.0 for examples.) Product Specification authors are strongly encouraged to find more conventional locations in the DCEG or main Product Specification instead.>*

## Annex B. Data Product format (encoding)

*<Product-specific information of significant importance related to the data format may be described in this Annex. It is not necessary to repeat S-100 format specifications in Part 10a, 10b, or 10c verbatim unless the Product Specification imposes significant restrictions or constraints. For an exceptional case where the format is documented as part of the Product Specification, see S-101 Edition 2.0.0. For GML products the documentation will generally be online documentation generated from the GML schema.>*

## Annex C. Normative Implementation Guidance *<optional>*

*<This section should contain guidance to assist in the implementation of the product specification>*

## Annex D. Feature Catalogue

*<The DCEG documents the types defined in the feature catalogue, so this Annex will generally be no more than a nominal placeholder for the XML Feature Catalogue.>*

## Annex E. Portrayal Catalogue

*<Documentation of portrayal catalogue elements may be generated or manually created. If no documentation is created, this Annex will generally be no more than a nominal placeholder for the Portrayal Catalogue.>*

## Annex F. Use Cases *<optional>*

## Annex G. <Annexes G, H, I, ... as needed>

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