

World Meteorological Organization



Weather Overlay Product Specification

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1 Overview

This document has been produced by the Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM) Expert Team on Maritime Safety Services (ETMSS) to produce a data product that can be used as a Nautical Information Publication Overlay (NPIO) 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 maritime weather and sea condition analyses and forecasts for situational awareness and planning purposes.

As part of the International Maritime Organization's (IMO) Global Maritime Distress and Safety System (GMDSS) and International Convention for the Safety of Life at Sea (SOLAS), the WMO Marine Programme broadcasts meteorological information and warnings to mariners. The world's oceans are divided into sixteen metareas, or areas of responsibility of dissemination for meteorological information. Each metarea has one or more countries that are responsible for issuing and disseminating weather bulletins and warnings within the defined metarea location.

This action is intended to define an internationally accepted feature catalogue that models real-world weather and oceanographic phenomena and can be used to create ECDIS-compatible maritime weather charts. These weather elements will be used by mariners for route-planning and hazard mitigation.

1.1 Scope

This document describes an S-100 compliant product specification for Weather Overlay datasets, which will primarily act as an overlay for S-101 Electronic Navigational Charts for an S-100 based ECDIS, in order to provide the maritime community with greater situational awareness. It specifies the content, structure, and metadata needed for creating a fully compliant Weather Overlay dataset and for its portrayal within an S-100 ECDIS. This product specification includes the content model, the encoding, the feature catalogue, portrayal catalogue and metadata.

1.2 References

S-100 IHO Universal Hydrographic Data Model

1.3 Terms, definitions and abbreviations

1.3.1 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.

1.3.2 Terms and Definitions

Data set

A grouping of features, attributes, geometry and metadata which comprises a specific product.

Metarea

The number designating a geographic sea area established for the purpose of coordinating the broadcast of marine meteorological information.

1.3.3 Abbreviations

CRS	Coordinate Reference System
DCEG	Data Classification and Encoding Guide
ECDIS	Electronic Chart Display Information System
EPSG	European Petroleum Survey Group
ENC	Electronic Navigational Chart
ETMSS	Expert Team on Maritime Safety Services
GFM	General Feature Model
GMDSS	Global Maritime Distress and Safety System
IHO	International Hydrographic Organization
IMO	International Maritime Organization
IOC	Intergovernmental Oceanographic Commission
ISO	International Organization for Standardization
JCOMM	Joint WMO/IOC Commission for Oceanography and Marine Meteorology
SOLAS	International Convention for Safety of Life at Sea
WMO	World Meteorological Organization
WXO	Weather Overlay
XML	Extensible Mark-up Language

1.4 Weather Overlay Data Product Description

Title: Weather Overlay

Abstract: This data product describes real-world weather and oceanographic phenomena and can be used to create ECDIS-compatible maritime weather analysis and forecast charts. These weather elements will be used by mariners for route-planning and hazard mitigation.

Content: The Product Specification defines all requirements to which Weather Overlay data products must conform. Specifically it defines the data product content in terms of features and attributes within the feature catalogue. The display of features is defined by the symbols and rule sets contained in the portrayal catalogue. The Data Classification and Encoding Guide (DCEG) provides guidance on how data product content must be captured. (Annex A)

Spatial Extent:

Description: Areas specific to marine navigation

East Bounding Longitude: 180°

West Bounding Longitude: -180°

North Bounding Latitude: 90°

South Bounding Latitude: -90°

Purpose: The purpose of a Weather Overlay dataset is to provide official ocean forecast data to act as an overlay to Electronic Navigational Charts to assist in situational awareness and decision-making for the mariner.

1.5 Data product specification metadata

Title:

S-100 Version: 1.0.0

S-412 Version: 0.0.1

Date: September 2013

Language: English

Classification: Unclassified

Contact: World Meteorological Organization

7bis, avenue de la Paix
Case postale 2300
CH -1211 Geneva 2
Switzerland

URL: www.wmo.int

Identifier: S-412

Maintenance: Changes to this product specification are coordinated by the WMO Joint WMO/IOC Commission for Oceanography and Marine Meteorology (JCOMM) Expert Team on Maritime Safety Services (ETMSS).

1.5.1 Product Specification Maintenance

1.5.1.1 Introduction

Changes to the Weather Overlay will be released by WMO/JCOMM as a new edition, revision, or clarification.

1.5.1.2 New Edition

New Editions of the Weather Overlay 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-10n.

1.5.1.3 Revisions

Revisions are defined as substantive semantic changes. Typically, revisions will 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 this specification. 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 this product specification.

1.5.1.4 Clarification

Clarifications are non-substantive changes. 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 the product specification.

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.

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

1.5.1.5 Version Numbers

The associated version control numbering to identify changes (n) to the product specification 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

Scope ID: Root Scope

Level: Dataset

Level name: Weather Overlay Dataset

3 Dataset Identification

Title: Weather Overlay

Alternate Title: W XO

Abstract:	Weather Overlay datasets must be produced in accordance with the rules defined in this product specification. This product specification contains all the information necessary to enable responsible meteorological organizations to produce a consistent Weather Overlay, and manufactures to use that data efficiently in an ECDIS.
Topic Category:	climatologyMeteorologyAtmosphere (ISO 19115 Domain Code 004) oceans (ISO 19115 Domain Code 014)
Geographic Description:	Areas specific to ocean forecasts
Spatial Resolution:	Weather Overlay datasets must carry a display scale that is defined by this specification: Display scale: 1:700,000
Purpose:	The Weather Overlay dataset is for primary use in Electronic Chart Display and Information Systems (ECDIS)
Language:	English (Mandatory), other (Optional)
Classification:	Data can be classified as one of the following: Unclassified Restricted Confidential Secret Top Secret
Spatial Representation Type:	Vector
Point of Contact:	Producing Agency
Use Limitation:	This dataset is not to be used for land-based or aviation weather forecast purposes.

4 Data Content and structure

4.1 Introduction

The Weather Overlay is a feature-based product. The content information is described in terms of a general feature model and a feature catalogue.

4.2 Application Schema

<Normally, the full application schema is described in this section. It can be described using UML, however, for specifications that have large application schemas (such as S-101) it can also be realised in the feature catalogue and the product specification can contain specific examples.>

The Weather Overlay conforms to the General Feature Model (GFM) from S-100 Part 3. The GFM is the conceptual model and the implementation is defined in the Feature Catalogue. The Weather Overlay Application Schema is realised in the feature catalogue and the product specification only contains specific examples.

4.3 Feature Catalogue

4.3.1 Introduction

The Weather Overlay Feature Catalogue describes the feature types, information types, attributes, and attribute values which may be used in a WXO dataset.

The Weather Overlay Feature Catalogue is available in an XML document which conforms to the S-100 XML Feature Catalogue Schema and can be downloaded from the WMO/JCOMM. It is also available in a human readable version.

4.3.2 Feature Types

4.3.2.1 Geographic

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

4.3.2.2 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.

4.3.3 Feature Relationship

A feature relationship links instances of one feature type with instances of the same or a different feature type. There are four types of defined feature relationships in S-101 as described in the following sub clauses.

4.3.3.1 Information Association

An association is used to describe a relationship between an information type and a feature type that involves connections between their instances.

EXAMPLE A **Supplementary Information** information type provides additional information to any geo feature using an information association called **additional information**.

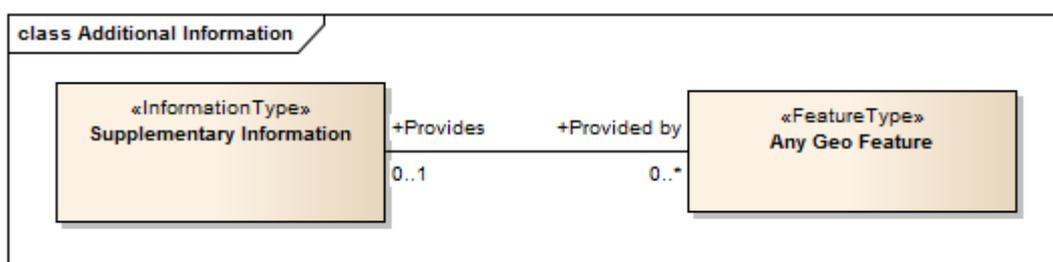


Figure 1 - Information Association

4.3.4 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.

4.3.4.1 Simple Attributes

The following table lists the types of attributes that are used in the W XO

Type	Definition
Enumeration	A fixed list of valid identifiers of named literal values
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 and Time	A DateTime is a combination of a date and a time type. Character encoding of a DateTime shall follow ISO 8601:1988 EXAMPLE 19850412T101530

4.3.4.2 Complex Attributes

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

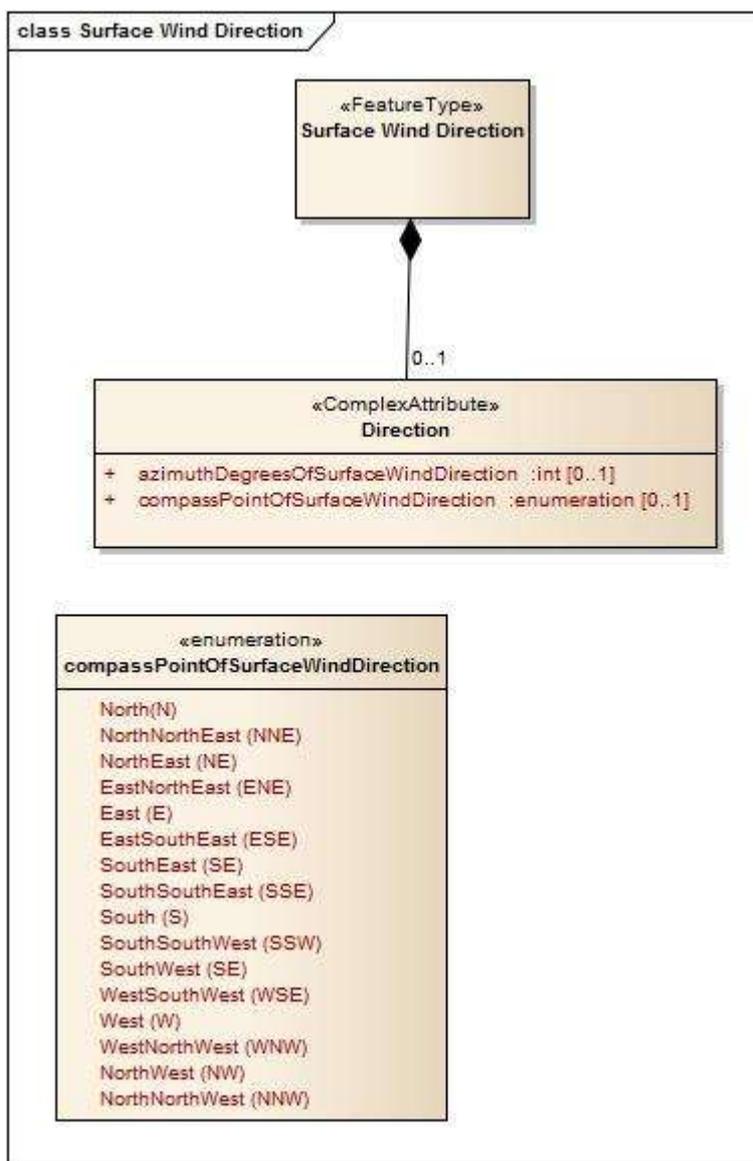


Figure 1 In this example **Direction** has two sub attributes. The Surface Wind Direction Feature may optionally include one instance of the complex attribute **Direction**.

4.4 Dataset Types

4.4.1 Introduction

A DataSet is a grouping of features, attributes, geometry and metadata which comprises a specific coverage. A data set can contain only one **DataCoverage**. The data boundary is defined by the extent of the **DataCoverage** features and must be contained within the **boundingBox**. Datasets and **DataCoverage** features within these data sets may overlap.

In order to facilitate the efficient processing of Weather Overlay data the geographic coverage of a given maximum display scale must be split into data sets. Each data set must be contained in a physically separate, uniquely identified file on the transfer medium.

Datasets may cross the 180° meridian; this includes both the **DataCoverage** features and the **boundingBox**.

4.5 Dataset Loading and Unloading

< TSMAD to provide some guidance on how non ENC data should load and unload in relation to ENC data.>

4.6 Geometry

4.6.1 S-100 Level 3a Geometry

The underlying geometry of a Weather Overlay is constrained to level 3a which supports 0, 1 and 2 dimensional objects (points, curves and surfaces) as defined by S-100 Part 7 – Spatial Schema.

Level 3a is described by the following constraints:

- Each curve must reference a start and end point (they may be the same).
- Curves must not self-intersect. See Figure 2.
- Areas are represented by a closed loop of curves beginning and ending at a common point.
- In the case of areas with holes, all internal boundaries must be completely contained within the external boundary and the internal boundaries must not intersect each other or the external boundary. Internal boundaries may touch tangentially (i.e. at one point). See Figure 3.
- The outer boundary of a surface must be in a clockwise direction (surface to the right of the curve) and the curve orientation positive. The inner boundary of a surface must be in a counter-clockwise direction (surface to the right of the curve) and the curve orientation negative. See Figure 4.

Weather Overlay further constrains Level 3a with the following:

- Coincident linear geometry must be avoided when there is a dependency between features.
- The interpolation of GM_CurveSegment must be loxodromic.
- Linear features must not be encoded with a distance between two consecutive vertices which is smaller than 0.3mm at maximum display scale.

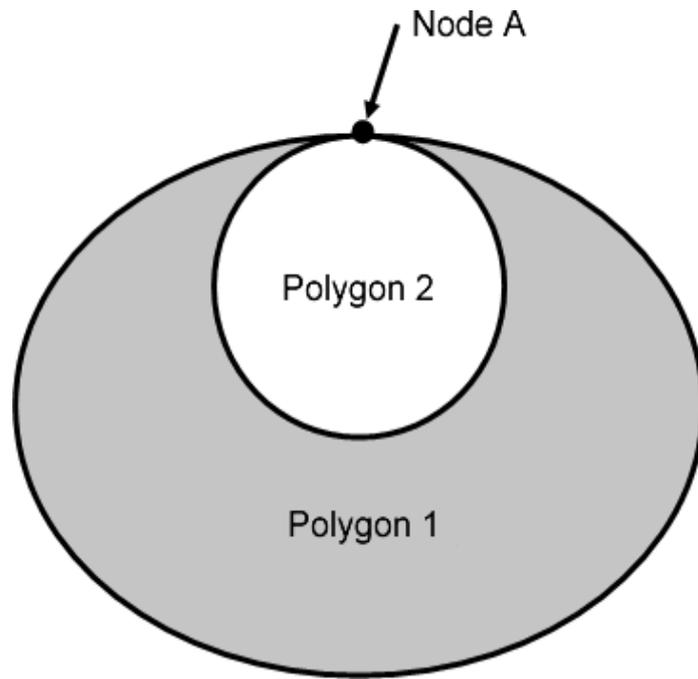


Figure 2 - Self Intersect Example

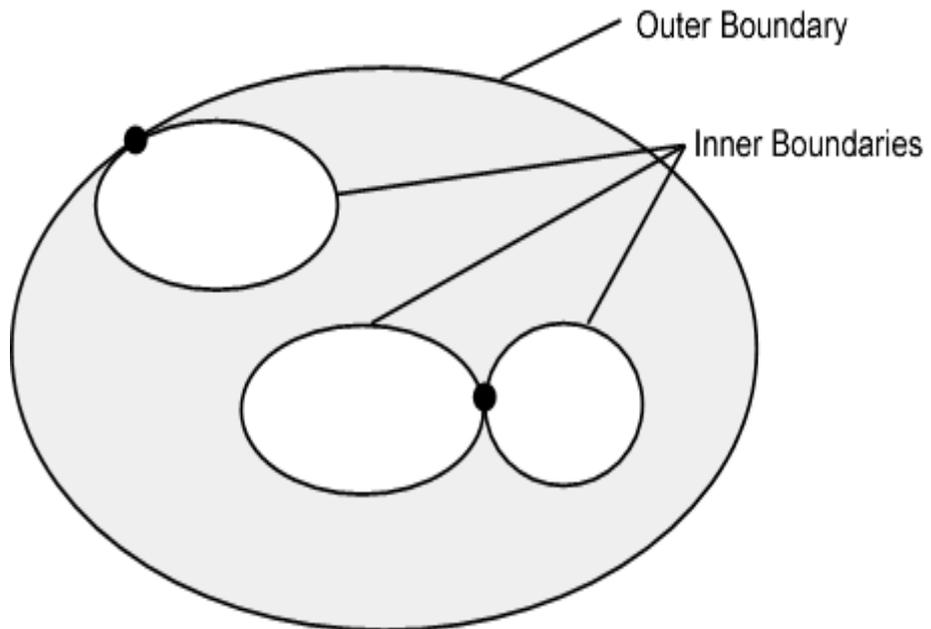


Figure 3 - Area Holes

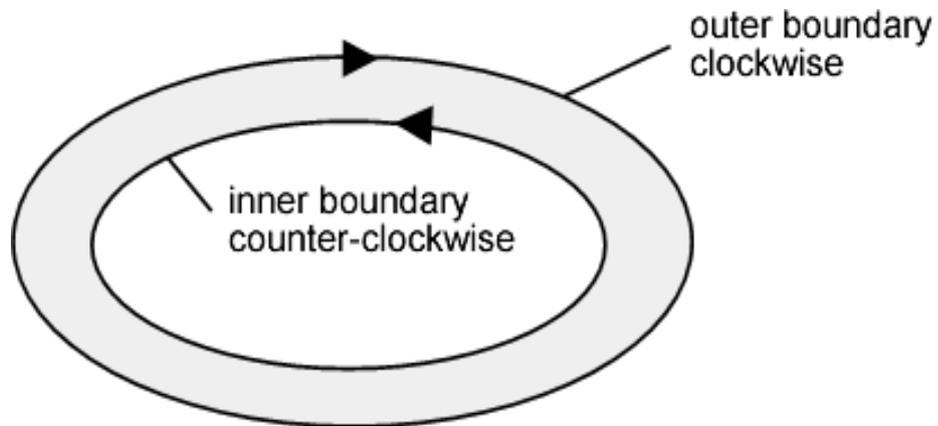


Figure 4 - Boundary Direction

4.6.2 Masking

In certain circumstances, the symbolisation of an edge may need to be suppressed. This is done using the Masked Spatial Type [MASK] field of the Feature Type record. The Mask Update Instruction [MUIN] must be set to {1} and Referenced Record name [RRNM] and Referenced Record identifier [RRID] fields must be populated with the values of the referenced spatial record. The Mask Indicator [MIND] must be set to either {1} or {2} (see Annex B – clause B1.5.13)

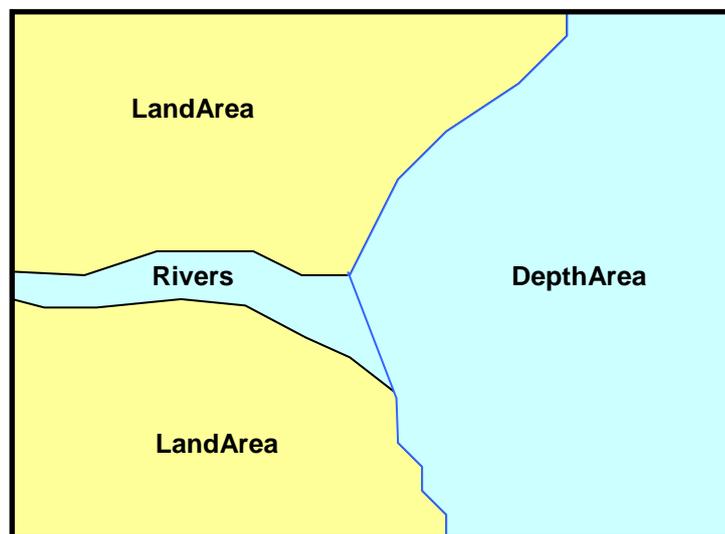


Figure 5 - Example without Masking

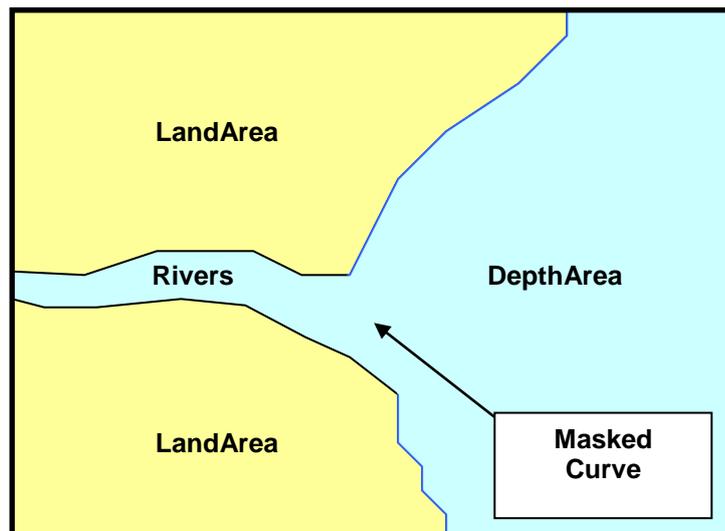


Figure 6 - Example of masked edge between Rivers and Depth Area features, where the River should be masked. In this example MIND is set to {2} – suppress portrayal

5 Coordinate Reference Systems (CRS)

5.1 Introduction

When describing geographic information it is common practice to separate the horizontal and vertical part of a position. This leads to 2D Coordinate Reference Systems for the horizontal positions and 1D Coordinate Reference Systems for the vertical positions. To describe 3D coordinates those Coordinate Reference Systems must be combined to produce a compound Coordinate Reference System. An ENC data set must define at least one compound CRS. A compound CRS is composed of 2D geodetic CRS (WGS84) and a vertical CRS that defines pressure.

The coordinate reference system used for this product specification is World Geodetic System 1984 (WGS 84) which is defined by the European Petroleum Survey Group (EPSG) code 4326, (or similar - North American Datum 1983 / Canadian Spatial Reference System).

Horizontal coordinate reference system: EPSG:4326 (WGS84)

Vertical coordinate reference system:

Pressure

Projection:

None

Temporal reference system:

Gregorian calendar

Coordinate reference system registry: [EPSG Geodetic Parameter Registry](http://www.epsg.org/)

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

Responsible party:

International Organisation of Oil and Gas Producers (OGP)

URL:

<http://www.ogp.org.uk/>

5.2 Vertical CRS for Pressure

Although all coordinates in a data set must refer to the same horizontal CRS different Vertical Datums can be used for the pressure component of a coordinate tuple. Therefore the vertical CRS can be repeated. For each Vertical CRS a unique identifier is defined. Those identifiers will be used to indicate which Vertical CRS is used. Units must be in pascals (Pa).

6 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.>

7 Data Capture and Classification

The Weather Overlay Data Classification and Encoding Guide (DCEG) describes how data describing the real world should be captured using the types defined in the Weather Overlay Feature Catalogue. This Guide is located in Annex A.

8 Maintenance

This clause describes the maintenance process for datasets, source, production process and how feature and portrayal catalogues are to be managed within an S-100 ECDIS.

8.1 Maintenance and Update Frequency

Datasets are maintained as needed and must include mechanisms for updating the Weather Overlay. Datasets are updated temporally according to the internal policies and practices of issuing offices. Updates will be made by new editions. Amendments and corrections will be produced as necessary.

8.2 Data Source

Data Producers must use applicable sources to maintain and update data and provide a brief description of the sources that were used to produce the dataset.

8.3 Feature and Portrayal Catalogue Management

For each new version of the Weather Overlay Product Specification a cumulative feature and portrayal catalogue will be released. This will allow the ECDIS to only have to manage a single feature and portrayal catalogue that are compatible with different datasets that compliant to different versions of the product specification.

9 Portrayal

Item Name	Description	M/O	Card	type
-----------	-------------	-----	------	------

portrayalLibraryCitation	Bibliographic reference to the portrayal library	O	0..1	CI_Citation (ISO 19115)
--------------------------	--	---	------	-------------------------

10 Data Product format (encoding)

10.1 Introduction

This clause specifies the encoding for Weather Overlay datasets. See Annex B for a complete description of the data records, fields and subfields defined in the encoding.

Format Name: ISO/IEC 8211

Character Set: ISO 10646 Base Multilingual Plane

Specification: S-100 profile of ISO/IEC 8211 (part 10A)

10.2 Encoding of Latitude and Longitude

Coordinates are stored as integers. Latitude and longitude are converted to integers using a multiplication factor held in the Data Set Structure Information field under [CMFX] and [CMFY] (see Annex B – clause B1.6.3).

These coordinate multiplication factors must be set to {10000000} (10^7) for all datasets.

EXAMPLE A longitude = 42.0000 is converted into $X = \text{longitude} * \text{CMFX} = 42.0000 * 10000000 = 420000000$.

10.3 Numeric Attribute Encoding

Floating point or integer attribute values must not be padded by non-significant zeroes.

10.4 Text Attribute Values

Character strings must be encoded using the character set defined in ISO 10646-1, in Unicode Transformation Format-8 (UTF-8). A BOM (byte order mark) must not be used

10.5 Mandatory Attribute Values

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

- They determine whether a feature is in the display base,
- Certain features make no logical sense without specific attributes,
- Some attributes are necessary to determine which symbol is to be displayed,

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

10.6 Missing Attribute Values

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

11 Data Product Delivery

11.1 Introduction

Weather Overlay datasets are grouped into exchange sets. Each exchange set consists of one or more Weather Overlay 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.

Units of Delivery:	Exchange Set
Transfer Size:	Unlimited
Medium Name:	Digital data delivery

Other Delivery Information:

Each exchange set has a single exchange catalogue which contains the discovery metadata for each dataset and references to any support files.

Support files are supplementary information which are linked to the features by the following fields within the dataset.

- textualDescription

An exchange set is encapsulated into a form suitable for transmission by a mapping called an encoding. An encoding translates each of the elements of the exchange set into a logical form suitable for writing to media and for transmission online. An encoding may also define other elements in addition to the exchange set contents (i.e. media identification, data extents etc...) and also may define commercial constructs such as encryption and compression methods.

If the data are transformed, it must not be changed.

This product specification defines the encoding which must be used as a default for transmission of data between parties.

The encoding encapsulates exchange set elements as follows:

Mandatory Elements

- Weather Overlay datasets – ISO 8211 encoding of features/attributes and their associated geometry and metadata.
- Exchange Catalogue – the XML encoded representation of exchange set catalogue features [discovery metadata]. It also includes an additional file level CRC check per dataset.

Optional Elements

- Supplementary files – These are contained within the exchange set as files and the map from the name included within the dataset and the physical location on the media is defined within the Exchange Catalogue.
- Weather Overlay Feature Catalogue – If it is necessary to deliver the latest feature catalogue to the end user it may be done using the Weather Overlay exchange set mechanism for datasets
- Weather Overlay Portrayal Catalogue - If it is necessary to deliver the latest portrayal catalogue to the end user it may be done using the Weather Overlay exchange set mechanism for datasets.

11.2 Dataset

11.2.1 Datasets

One type of dataset files may be produced and contained within an exchange set:

- New dataset and new edition of a dataset: Including new information which has not been previously distributed by updates. Each new edition of a data set must have the same name as the data set that it replaces. A new edition can also be ENC data that has previously been produced for this area and at the same maximum display scale. The encoding structure is located in Annex B1.5

11.2.1.1 Dataset size

Datasets must not exceed 2MB

11.2.2 Dataset file naming

New datasets will be named according to the following convention:

WXO_XXXX_CC_MM_YYYY.000

Where WXO indicates the dataset, XXXX is the metarea, CC is 2-letter country code, MM indicates the month with two digits, and YYYY is the year.

Each dataset will be issued through new editions for a period of one month. At the beginning of the next calendar month, a cancellation will be issued and the new dataset issued.

11.2.3 New Editions and Cancellations

This section defines the sequencing of Weather Overlay datasets for New Editions. In order to ensure that feature type updates are incorporated into an ECDIS in the correct sequence without any omission, a number of parameters encoded in the data are used in the following way:

edition number	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.
issue date	date up to which the data producer has incorporated all applicable changes. The issue date must be greater than the previous issue date of the dataset.
issue time	time of day in UTC up to which the data producer has incorporated all applicable changes.

In order to cancel a data set, an update dataset file is created for which the edition number must be set to 0. This message is only used to cancel a base dataset file. Where a dataset is cancelled and its name is reused at a later date, the issue date must be greater than the issue date of the cancelled dataset. When the dataset is cancelled it must be removed from the system.

An exchange set may contain base dataset files and update dataset files for the same datasets. Under these circumstances the update dataset files must follow on in the correct sequential order from the last update applied to the base dataset file.

The Weather Overlay datasets will be issued according to the following schedule:

Month	Day	Editions Issued	File Name
1	1	1, 2	WXO_XII_2013_US_2013_01.000
1	2	3, 4	WXO_XII_2013_US_2013_01.000
1	3	5, 6, 7	WXO_XII_2013_US_2013_01.000
1	WXO_XII_2013_US_2013_01.000
1	31	66, 67	WXO_XII_2013_US_2013_01.000
2	1	Cancellation	WXO_XII_2013_US_2013_01.000
2	1	1, 2	WXO_XII_2013_US_2013_02.000
2	2	3, 4	WXO_XII_2013_US_2013_02.000
2	3	5, 6	WXO_XII_2013_US_2013_02.000
2	WXO_XII_2013_US_2013_02.000
2	28	70, 71	WXO_XII_2013_US_2013_02.000
2	1	Cancellation	WXO_XII_2013_US_2013_02.000
3	1	1, 2	WXO_XII_2013_US_2013_03.000
3	WXO_XII_2013_US_2013_03.000

A new dataset will be issued on the first day of every month. The editions will start at number 1 and increase sequentially with every dataset issuance. Before a new Weather Overlay dataset is issued in the next month, a cancellation will be issued, cancelling the previous month's dataset.

11.3 Support Files

Data set support files offer supplementary information that can be included in an ENC exchange set.

- *Text files must contain only general text as defined by this standard. (Extensible mark-up language (XML) supports UTF-8 character encoding). (TXT), (XML), (HTM)*

File Types	Extensions	Comment
Text	TXT	
	HTM	HTML files must only include inline or embedded Cascading Style Sheet (CSS) information and must not embed Javascript or other dynamic content e.g. DHTML, Flash etc.
	XML	XML documents must only be included in accordance with guidance provided within the Data Classification and Encoding Guide. This may include a schema for the validation of XML documents.

11.3.1 Support File Naming

Supporting files will be named according to the following convention:

WXO_XXXX_CC_MM_YYYY_TTT

Where WXO indicates the dataset, XXXX is the metarea, CC is 2-letter country code, MM indicates the month with two digits, YYYY is the year, and TTT is the type of file (ie: TXT, HTM, XML).

11.3.2 Support File Management

When a support file is created or a subsequent version is issued it must carry an issue date and a CRC value calculated on the content. These values are contained in the Support File Metadata as defined in clause 12.1.2 and must not change while the file is still current.

The type of support file is indicated in the “purpose” field of the discovery metadata. Support files carrying the “deletion” flag may be removed from the ECDIS. When a feature pointing to a text, picture or application file is deleted or updated so that it no longer references the file, the ECDIS software must check to see whether any other feature referenced the same file, before that file is deleted.

Support files should be stored in a separate folder within the exchange set.

11.4 Exchange Catalogue

<Specify if the datasets will be part of an exchange catalogue>

The exchange catalogue acts as the table of contents for the exchange set. The catalogue file of the exchange set must be named CATALOG.WO. No other file in the exchange set may be named CATALOG.WO. The contents of the exchange catalogue are described in Clause 12.

11.5 Data integrity

11.5.1 Weather Overlay data integrity measures

Where there is a high impact on the integrity of data as a result of data corruption, such as to Weather Overlay data, there is a need for a mechanism within the Weather Overlay data itself to ensure it has not changed during transmission/delivery. The mechanism chosen for this assurance is a Cyclic Redundancy Check (CRC). File integrity checks are based on the CRC-32 algorithm (a 32 bit Cyclic Redundancy Check algorithm) as defined in ANSI/IEEE Standard 802.3, the reference for which is given in clause 1.2.

11.5.2 Processing

Encoding is defined by the following generating polynomial:

$$G(x) = x^{32} + x^{26} + x^{23} + x^{22} + x^{16} + x^{12} + x^{11} + x^{10} + x^8 + x^7 + x^5 + x^4 + x^2 + x + 1$$

Processing is applied to relevant files as they appear in the exchange set.

The CRC value of the file is defined by the following process:

1. The first 32 bits of the data are complemented.
2. The n bits of the data are then considered to be the coefficients of a polynomial M(x) of degree n-1.
3. M(x) is multiplied by x^{32} and divided by G(x), producing a remainder R(x) of degree <31.
4. The coefficients of R(x) are considered to be a 32-bit sequence.
5. The bit sequence is complemented and the result is the CRC.

The hexadecimal format of CRCs are converted to ASCII characters and stored in the "Catalogue Directory" [CATD] field.

12 Metadata

12.1 Introduction

For information exchange, there are several categories of metadata required: 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.

This clause defines the mandatory and optional metadata needed for Weather Overlay datasets and exchange sets. In some cases the metadata may be repeated in a national language. If this is the case it is noted in the Remarks column.

Figures 14 to 16 outline the overall concept of an S-101 exchange set for the interchange of geospatial data and its relevant metadata. Figure 1 depicts the realization of the ISO 19139 classes which form the foundation of the exchange set. The overall structure of S-101 metadata for exchange sets is modelled in Figure 15. More detailed information about the various classes is shown in Figure 16 and a textual description in the tables at clause 12.3.

The discovery metadata classes have numerous attributes which enable important information about the datasets and accompanying support files to be examined without the need to process the data, e.g. decrypt, decompress, load etc. Other catalogues can be included in the exchange set in support of the datasets such as feature, portrayal, coordinate reference systems, code lists etc. The attribute “purpose” of the support file metadata provides a mechanism to update support files more easily.

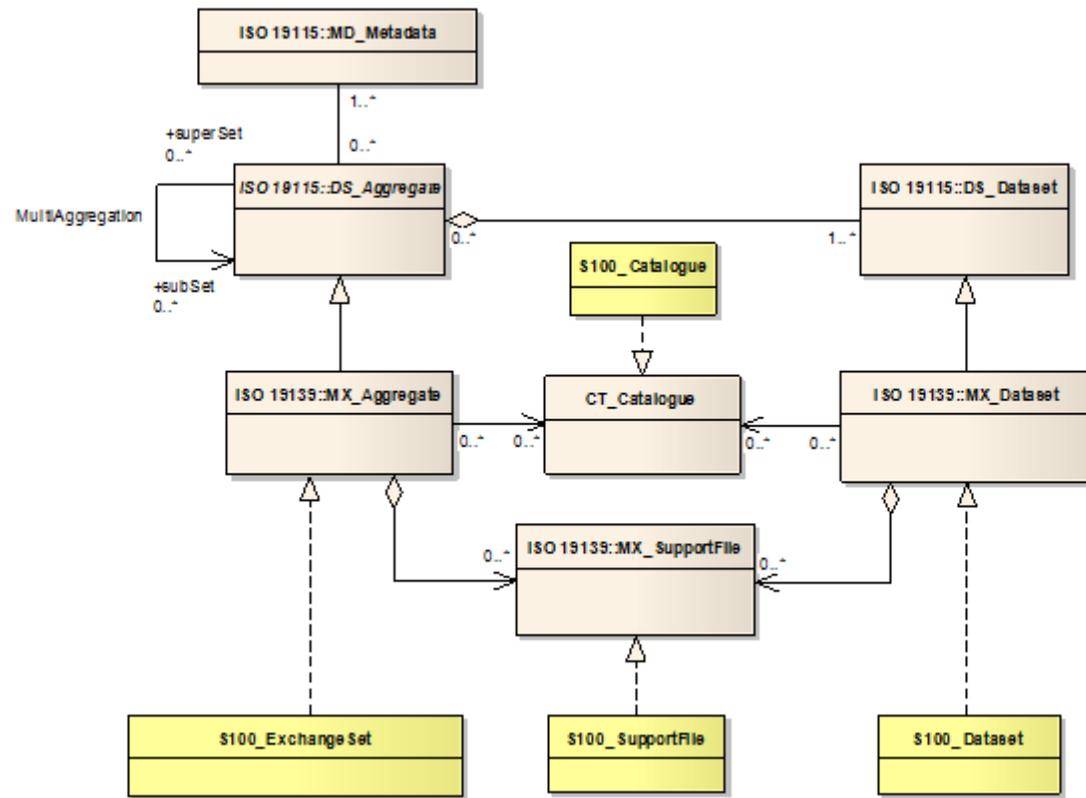


Figure 7 Realization of the Exchange Set Classes

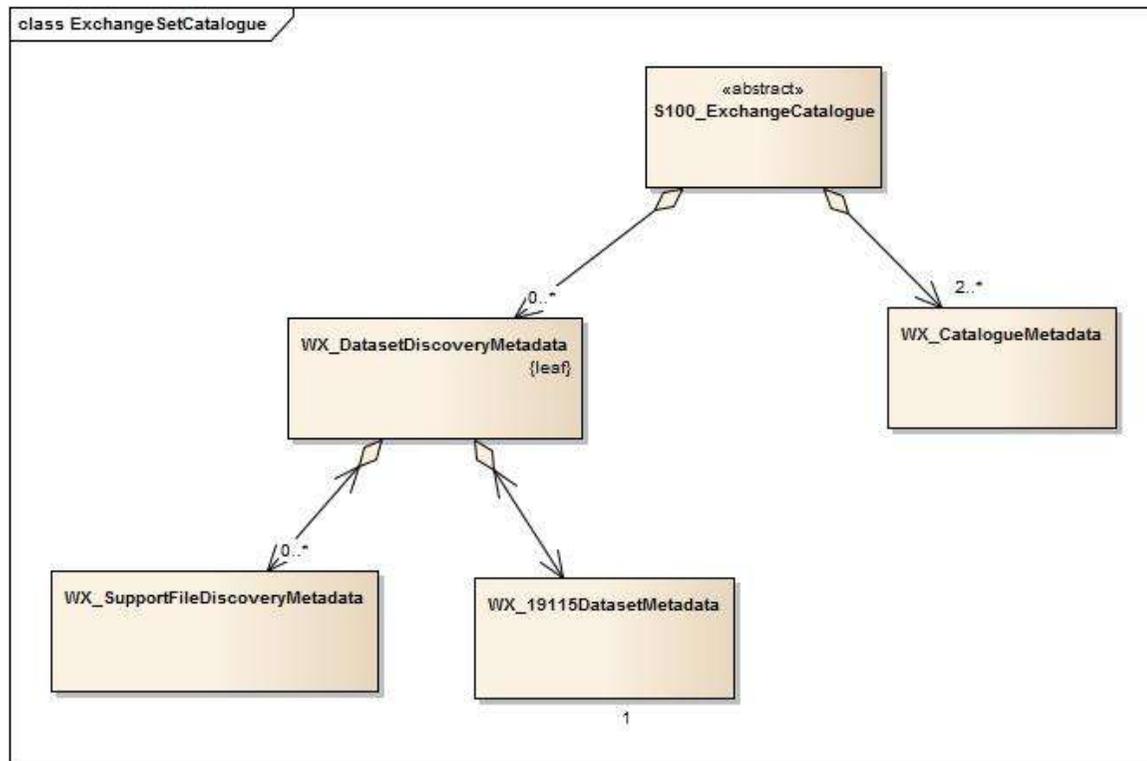


Figure 8 – S-101 ExchangeSet

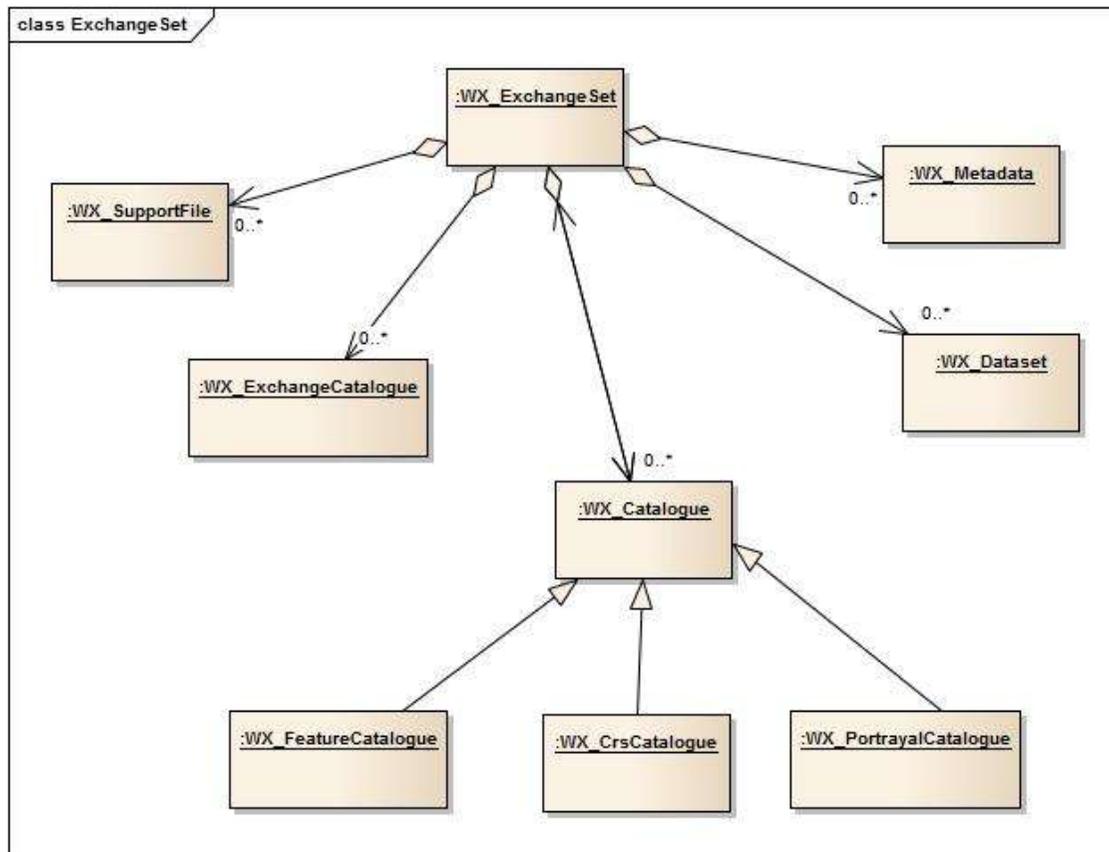


Figure 9 Weather Overlay Exchange Set

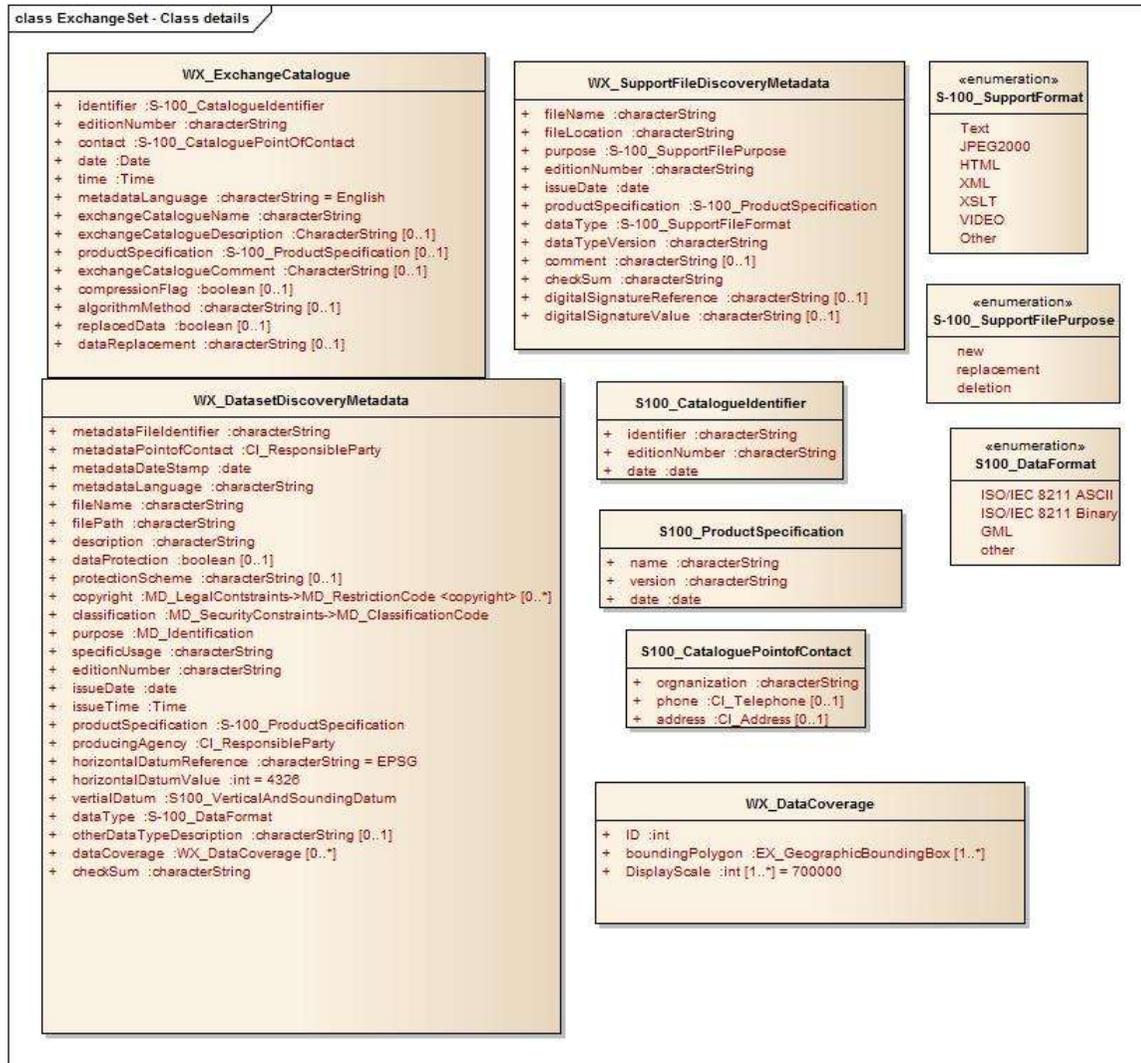


Figure 10 Weather Overlay Exchange Set - Class Details

12.1.1 Dataset Metadata

Name	Multiplicity	Value	Type	Remarks
WXO_DataSetDiscoveryMetadata	-			
metadataFileIdentifier	1		CharacterString	The file name must be unique. (name of the metadata file)
metadataPointOfContact	1		CI_ResponsibleParty	
metadataDateStamp	1		Date	
metadataLanguage	1	English	CharacterString	All data sets conforming to this Product Specification must use the English language
fileName	1		CharacterString	Dataset file name (name of the actual file...)
filePath	1		CharacterString	Path to the dataset file, relative to the root directory of the exchange set. The location of the dataset file after the exchange set is unpacked into directory <EXCH_ROOT> will be: <EXCH_ROOT>/<filePath>/<fileName>
description	1		CharacterString	Short description of the area covered by dataset harbour or port name, between two named locations etc. NATIONAL LANGUAGE enabled
dataProtection	1		Boolean	Encrypted or Unencrypted

Name	Multiplicity	Value	Type	Remarks
protectionScheme	0..1		CharacterString	e.g. S-63
copyright	0..*		MD_LegalConstraints ->MD_RestrictionCode <copyright> (ISO 19115)	
classification	1	{1} to {5}	Class MD_SecurityConstraints>MD_ClassificationCode (codelist)	1. unclassified 2. restricted 3. confidential 4. secret 5. top secret
purpose	1	{1} to {3}	CharacterString MD_Identification>purpose (character string)	1. New Dataset 2. New Edition 3.Cancellation
specificUsage	0..1		CharacterString MD_USAGE>specificUsage (character string) MD_USAGE>userContactInfo (CI_ResponsibleParty)	Brief description of the resource and/or resource series usage
editionNumber	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 re-issue.
issueDate	1		Date	Date on which the data was made available by the data producer.
issueTime	1		Time	Time in UTC at which the data was made available by the data producer.
productSpecification	1	WXO Version X.X.X	Character String	This must be encoded as WXO X.X.X

Name	Multiplicity	Value	Type	Remarks
producingAgency	1		CI_ResponsibleParty	Agency responsible for producing the data.
horizontalDatumReference	1	EPSG	CharacterString	
horizontalDatumValue	1	4326	Integer	WGS84
dataType	1	ISO 8211 BINARY	S100_DataFormat	
otherDataTypeDescription	0..1		CharacterString	
dataCoverage	1		WXO_DataCoverage	Provides information about data coverage within the dataset
checksum	1		CharacterString NonNegativeInteger	Expressed in hex notation

12.1.1.1 DataCoverage

Name	Multiplicity	Value	Type	Remarks
WXO_DataCoverage	-	-	-	-
ID	1		Integer	Uniquely identifies the coverage
boundingPolygon	1		EX_BoundingPolygon	
DisplayScale	1	700,000	Integer	

12.1.2 Support File Metadata

Name	Multiplicity	Value	Type	Remarks
WXO_SupportFileDiscoveryMetadata	-		-	-
fileName	1		CharacterString	
filePath	1		CharacterString	Full location from the exchange set root directory
purpose	1	{1} to {3}	class S100_SupportFilePurpose	<ol style="list-style-type: none"> 1. New – A file which is new 2. Replacement – A file which replaces an existing file

Name	Multiplicity	Value	Type	Remarks
				3. Deletion – deletes an existing file
editionNumber	1		CharacterString	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.
issueDate	1		Date	Date on which the data was made available by the data producer.
productSpecification	1		WXO_ProductSpecification	Version of WXO
dataType	1	{1} to {4}	class S100_SupportFileFormat	1. TXT =Text files 2. XML = Text files
dataTypeVersion	1		CharacterString	The version number of the dataType
Comment	0..1		CharacterString	Any additional Information NATIONAL LANGUAGE enabled
checksum	1		CharacterString	
digitalSignatureReference	0..1		CharacterString	Reference to the appropriate digital signature algorithm
digitalSignatureValue	0..1		CharacterString	

12.1.3 Exchange Catalogue File Metadata

The catalogue file is defined in XML schema language. The Exchange catalogue inherits the dataset discovery metadata and support file discovery metadata.

Name	Multiplicity	Value	Type	Remarks
WXO_ExchangeCatalogue	-			An exchange catalogue contains the discovery metadata about the exchange datasets and support files
identifier	1		CharacterString S100_CatalogueIdentifier	Uniquely identifies this exchange catalogue
editionNumber	1		CharacterString	The edition number of this exchange catalogue
contact	1		S100_CataloguePointofContact CI_ResponsibleParty	
date	1		Date	Creation date of the exchange catalogue
time	1		Time	Creation time in UTC of the exchange catalogue
MetadataLanguage	1	English	CharacterString	All data sets conforming to S-101 PS must use English language
exchangeCatalogueName	1	WEATHERCAT	CharacterString	Catalogue filename
exchangeCatalogueDescription	1		CharacterString	Description of what the exchange catalogue contains NATIONAL LANGUAGE enabled
productSpecification	1			WXO Version Number
exchangeCatalogueComment	0..1		CharacterString	Any additional Information NATIONAL LANGUAGE enabled
compressionFlag	1	{1} to {2}	CharacterString	1. Yes 2. No

Name	Multiplicity	Value	Type	Remarks
algorithmMethod	0..1	{1} to {2}	CharacterString	Conditional on if compresstionFlag is set to {1} 1. ZIP 2. RAR
replacedData	1			If a data file is cancelled is it replaced by another data file
dataReplacement	0..1			Dataset name

12.2 Language (S-57 PS 3.11)

The exchange language must be English. Other languages may be used as a supplementary option. National geographic names can be left in their original national language in the international attributes, or transliterated or transcribed and used in the international attributes.

Character strings must be encoded using the character set defined in ISO 10646-1, in Unicode Transformation Format-8 (UTF-8). A BOM (byte order mark) must not be used.

Annex A - Data Classification and Encoding Guide

<u>IHO Definition:</u> FEATURE: Definition. (Source of definition).				
S-10n Geo Feature:				
Primitives: Point, Curve, Surface Allowable geometric primitive(s)				
<i>Real World</i> Example if real world instance(s) of the Feature.	<i>Paper Chart Symbol</i> Example(s) of paper chart equivalent symbology for the Feature.	<i>ECDIS Symbol</i> Example(s) of ECDIS symbology for the Feature.		
S-10n Attribute	Allowable Encoding Value *	Type	Multiplicity	
Category of beer	1 : ale 2 : lager 3 : porter 4 : stout 5 : pilsener	EN	1,1	
This section lists the full list of allowable attributes for the S-10n 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).	This section lists the allowable encoding values for S-10n (for enumerate (E) Type attributes only). Further information about the attribute is available in Section XX.	Attribute type (see clause X.X).	Multiplicity describes the "cardinality" of the attribute in regard to the feature. See clause X.X.	
Fixed date range		C	0,1	
Date end		(S) DA	0,1	
Date start		(S) DA	0,1	
<u>INT 1 Reference:</u> The INT 1 location(s) of the Feature – by INT1 Section and Section Number.				
X.X.X Sub-clause heading(s) (see S-4 – B-YYY.Y)				
Introductory remarks. Includes information regarding the real world entity/situation requiring the encoding of the Feature in the ENC, and where required nautical cartographic principles relevant to the Feature to aid the compiler in determining encoding requirements.				
Specific instructions to encode the feature.				
<u>Remarks:</u>				
<ul style="list-style-type: none"> Additional encoding guidance relevant to the feature. 				
X.X.X.X Sub-sub-clause heading(s) (see S-4 – B-CCC.C)				
Clauses related to specific encoding scenarios for the Feature. (Not required for all Features).				
<u>Remarks:</u>				
<ul style="list-style-type: none"> Additional encoding guidance relevant to the scenario (only if required). 				
<u>Distinction:</u> List of features in the Product Specification distinct from the Feature.				

ANNEX B - NORMATIVE

Data Product format (encoding)

B1 Introduction

This Product Specification uses the S-100 8211 to encapsulate data. This annex specifies the interchange format to facilitate the moving of files containing data records between computer systems. It defines a specific structure which can be used to transmit files containing data type and data structures specific to S-101.

B1.1 Data set files

The order of data in each base or update dataset file is described below:

Data set file

- Data set general information record
- Data set structure information field structure
- Data set Coordinate Reference System record structure

Information records

Information

Vector records

- Point
- Multi point
- Curve
- Composite Curve
- Surface

Feature records

- Meta features
- Geo features
- Aggregated features
- Theme features

This order of records will enable the import software to check that the child record exists each time the parent record references it (i.e. it will already have read the child record so it will know if it exists or not).

B1.2 Records

Records and fields that do not appear in the following tree structure diagrams are prohibited. The order of records in the files must be the same as that described in these tree structure diagrams.

The combination of the file name and the "Name" of the record must provide a unique world-wide identifier of the record.

B1.3 Fields

For base dataset files, some fields may be repeated (indicated by <0..*> or <1..*>) and all of their content may be repeated (indicated by *). In order to reduce the volume of data, the encoder should repeat the sequence of subfields, in preference to creating several fields.

B1.4 Subfields

Mandatory subfields must be filled by a non-null value.

Prohibited subfields must be encoded as missing subfields values. The exact meaning of missing attribute values is defined in Annex A.

In the tables following the tree structure diagrams, prescribed values are indicated in the “values” column. The “comment” column contains general comments and an indication of whether the subfield is ASCII or binary coded.

When encoding new base data sets the record update instruction (RUI) is always set to insert. When encoding updates it can be set to insert, modify or delete.

B1.5 Base dataset structure

NOTE: The number contained in parenthesis () is the number of subfields that are contained in the field.

Base dataset file

```

|
|--<1>- Data Set General Information record
|   |
|   |--<1>-DSID (13\\*1): Data Set Identification field
|   |
|   |--<1>-DSSI (13): Data Set Structure Information field
|   |
|   |--<0..*>-ATTR (*5): Attribute field (Metadata)
|
|--<1>--Data Set Coordinate Reference System record
|   |
|   |--<1>-CSID (3): Coordinate Reference System Record Identifier field
|   |
|   |--<1..*>-CRSH (7): Coordinate Reference System Header field
|   |
|   |--<0..1>-CSAX (*2): Coordinate System Axes field
|   |
|   |--<0..1>-VDAT (4): Vertical Datum field
|
|--<0..*>--Information record
|   |
|   |--<1>-IRID (5): Information Type Record Identifier field
|   |
|   |--<0..*>- ATTR (*5): Attribute field
|   |
|   |--<0..*>- INAS (5\\*5): Information Association field
|
|--<0..*>-- Point record
|   |
|   |--<1>-PRID (4): Point Record Identifier field
|   |
|   |--<0..*>-INAS (5\\*5): Information Association field
|   |
|   | alternate coordinate representations
|   |
|   |--<1>-C2IT (2): 2-D Integer Coordinate Tuple field
|   |
|   |--<1>-C3IT (4): 3-D Integer Coordinate Tuple field
|

```

```

|--<0..*>-- Multi Point record
|
|  |--<1>-MRID (4): Multi Point Record Identifier field
|  |
|  |  |--<0..*>-INAS (5\\*5): Information Association field
|  |  |
|  |  |  alternate coordinate representations
|  |  |
|  |  |--<0..*>-C2IL (*2): 2-D Integer Coordinate List field
|  |  |
|  |  |--<0..*>-C3IL (1\\*3): 3-D Integer Coordinate List field
|  |
|
|--<0..*>-- Curve record
|
|  |--<1>-CRID (4): Curve Record Identifier field
|  |
|  |  |--<0..*>-INAS (5\\*5): Information Association field
|  |  |
|  |  |--<1>-PTAS (*3): Point Association field
|  |  |
|  |  |--<1>-SEGH (1): Segment Header field
|  |  |
|  |  |--<1..*>-C2IL (*2): 2-D Integer Coordinate List field
|  |
|
|--<0..*>-- Composite Curve record
|
|  |--<1>-CCID (4): Composite Curve Record Identifier field
|  |
|  |  |--<0..*>-INAS (5\\*5): Information Association field
|  |  |
|  |  |--<0..*>-CUCO (*3): Curve Component field
|  |
|
|--<0..*>-- Surface record
|
|  |--<1>-SRID (4): Surface Record Identifier field
|  |
|  |  |--<0..*>-INAS (5\\*5): Information Association field
|  |  |
|  |  |--<1..*>-RIAS (*5): Ring Association Field
|  |
|
|--<0..*>-- Feature Type record
|
|  |--<1>-FRID (5): Feature Type Record Identifier field
|  |
|  |  |--<0..*>-ATTR (*5): Attribute field
|  |  |
|  |  |--<0..*>-INAS (5\\*5): Information Association field
|  |  |
|  |  |--<0..*>-SPAS (*6): Spatial Association field
|  |  |
|  |  |--<0..*>-FASC (5\\*5): Feature Association field
|  |  |
|  |  |--<0..*>-THAS (*3): Theme Association field
|  |  |
|  |  |--<0..*>-MASK (*4): Masked Spatial Type field

```

B1.5.1 Field Content

B1.5.2 Data Set Identification field - DSID

Subfield name	Label	Value	Format	Comment
Record name	RCNM	{10}	b11	{10} - Data Set Identification
Record identification number	RCID	{1}	b14	Only one record
Encoding specification	ENSP	'S-100 Part 10a'	A()	Encoding specification that defines the encoding
Encoding specification edition	ENED	"1.1"	A()	Edition of the encoding specification
Product identifier	PRSP	"INT.IHO.S-412"	A()	Unique identifier for the data product as specified in the product specification
Product edition	PRED	"1.0"	A()	Edition of the product specification
Application profile	PROF	"1"	A()	"1" – EN Profile
Dataset file identifier	DSNM		A()	The file name including the extension but excluding any path information
Dataset title	DSTL		A()	The title of the dataset
Dataset reference date	DSRD		A(8)	The reference date of the dataset Format: YYYYMMDD according to ISO 8601
Dataset language	DSLG	"EN"	A()	The (primary) language used in this dataset
Dataset abstract	DSAB	omitted	A()	The abstract of the dataset
Dataset edition	DSED		A()	See clause ??
Dataset topic category	*DSTC	{04}{14}	b11	A set of topic categories

B1.5.3 Data Set Structure Information field - DSSI

Subfield name	Label	Value	Format	Comment
Dataset Coordinate Origin X	DCOX	{0.0}	b48	Shift used to adjust x-coordinate before encoding
Dataset Coordinate Origin Y	DCOY	{0.0}	b48	Shift used to adjust y-coordinate before encoding
Dataset Coordinate Origin Z	DCOZ	{0.0}	b48	Shift used to adjust z-coordinate before encoding
Coordinate multiplication factor for x-coordinate	CMFX	{10 ⁷ }	b14	Floating point to integer multiplication factor for the x-coordinate or longitude
Coordinate multiplication factor for y-coordinate	CMFY	{10 ⁷ }	b14	Floating point to integer multiplication factor for the y-coordinate or latitude
Coordinate multiplication factor for z-coordinate	CMFZ	{100}	b14	Floating point to integer multiplication factor for the z-coordinate or depths or height
Number of Information Type records	NOIR		b14	Number of information records in the data set
Number of Point records	NOPN		b14	Number of point records in the data set
Number of Multi Point records	NOMN		b14	Number of multi point records in the data set
Number of Curve records	NOCN		b14	Number of curve records in the data set
Number of Composite Curve records	NOXN		b14	Number of composite curve records in the data set

Number of Surface records	NOSN		b14	Number of surface records in the data set
Number of Feature Type records	NOFR		b14	Number of feature records in the data set

B1.5.4 Attribute field - ATTR

Subfield name	Label	Value	Format	Comment
Attribute label/code	*ATLB		b12	A valid attribute code
Attribute index	ATIX		b12	Index (position) of the attribute in the sequence of attributes with the same code and the same parent (starting with 1).
Parent index	PAIX		b12	Index (position) of the parent complex attribute within this ATTR field (starting with 1). If the attribute has no parent (top level attribute) the value is 0.
Attribute Instruction	ATIN	{1}	b11	{1} - Insert
Attribute value	ATVL		A()	A string containing a valid value for the domain of the attribute specified by the subfields above.

B1.5.5 Information Association field - INAS

Subfield name	Label	Value	Format	Subfield content and specification
Referenced Record name	*RRNM	150	b11	Record name of the referenced record
Referenced Record identifier	RRID		b14	Record identifier of the referenced record
Information Association code	IASS		b12	A valid code for the information association
Role code	ROLE		b12	A valid code for the role
Information Association Update Instruction	IUIN		b11	{1} - Insert {2} - Delete {3} - Modify
Attribute label/code	*ATLB		b12	A valid attribute code
Attribute index	ATIX		b12	Index (position) of the attribute in the sequence of attributes with the same code and the same parent (starting with 1).
Parent index	PAIX		b12	Index (position) of the parent complex attribute within this INAS field (starting with 1). If the attribute has no parent (top level attribute) the value is 0.
Attribute Instruction	ATIN		b11	{1} - Insert {2} - Delete {3} - Modify
Attribute value	ATVL		A()	A string containing a valid value for the domain of the attribute specified by the subfields above.

B1.5.6 Coordinate Reference System Record Identifier field - CSID

Subfield name	Label	Value	Format	Comment
Record name	RCNM	{15}	b11	{15} - Coordinate Reference System Identifier
Record identification number	RCID	{1}	b14	Only one record
Number of CRS Components	NCRC		b11	{1} - Single CRS >{1} - Compound CRS

B1.5.7 Coordinate Reference System Header field - CRSH

Subfield name	Label	Value	Format	Comment
CRS index	CRIX		b11	1 – for the horizontal CRS >1 – for the vertical CRS's

CRS Type	CRST	{1} or {5}	b11	{1} – 2D Geographic {5} - Vertical
Coordinate System Type	CSTY	{1} or {3}	b11	{1} - Ellipsoidal CS {3} - Vertical CS
CRS Name	CRNM	“WGS84” for horizontal CRS “Depth - *” for vertical CRS where * is the name of the vertical datum	A()	
CRS Identifier	CRSI	“4326” – for horizontal CRS “omitted for vertical CRS	A()	
CRS Source	CRSS	{3} for horizontal CRS {255} for vertical CRS	b11	{3} - EPSG {255} - Not Applicable
CRS Source Information	SCRI	omitted	A()	

B1.5.8 Coordinate System Axes field - CSAX

This field is only used for vertical CRS.

Subfield name	Label	Value	Format	Comment
Axis Type	*AXTY	{12}	b11	{12} – Gravity related depth (orientation down)
Axis Unit of Measure	AXUM	{4}	b11	{4} - Metre

B1.5.9 Vertical Datum field – VDAT

This field is only used for vertical CRS.

Subfield name	Label	Value	Format	Comment
Datum Name	DTNM		A()	Name of the enumeration value of the attribute VERDAT
Datum Identifier	DTID		A()	Enumeration value of the attribute VERDAT
Datum Source	DTSR	{2}	b11	{2} - Feature Catalogue
Datum Source Information	SCRI	omitted	A()	

B1.5.10 Information Type Identifier field - IRID

Subfield name	Label	Value	Format	Comment
Record name	RCNM	{150}	b11	{150} - Information Type
Record identification number	RCID		b14	Range: 1 to 2 ³² -2
Object code	OBJC		b12	A valid information type code from the FC
Record version	RVER		b12	RVER contains the serial number of the record edition
Record update instruction	RUIN	{1}	b11	{1} - Insert

B1.5.11 Point Record Identifier field - PRID

Subfield name	Label	Value	Format	Comment
Record name	RCNM	{110}	b11	{110} - Point
Record identification number	RCID		b14	Range: 1 to 2 ³² -2
Record version	RVER		b12	RVER contains the serial number of the record edition
Record update instruction	RUIN	{1}	b11	{1} – Insert

B1.5.12 2-D Integer Coordinate Tuple field structure – C2IT

Subfield name	Label	Value	Format	Comment
Coordinate in Y axis	*YCOO		b24	Y-coordinate or latitude
Coordinate in X axis	XCOO		b24	X-coordinate or longitude

B1.5.13 3-D Integer Coordinate Tuple field structure– C3IT

Subfield name	Label	Value	Format	Comment
Vertical CRS Id	VCID		b11	Internal identifier of the Vertical CRS
Coordinate in Y axis	*YCOO		b24	Y- coordinate or latitude
Coordinate in X axis	XCOO		b24	X- coordinate or longitude
Coordinate in Z axis	ZCOO		b24	Z - coordinate (depth)

B1.5.14 Multi Point Record Identifier field - MRID

Subfield name	Label	Value	Format	Comment
Record name	RCNM	{115}	b11	{115} - Multi Point
Record identification number	RCID		b14	Range: 1 to 2 ³² -2
Record version	RVER		b12	RVER contains the serial number of the record edition
Record update instruction	RUIN	{1}	b11	{1} - Insert

B1.5.15 2-D Integer Coordinate List field structure – C2IL

Subfield name	Label	Value	Format	Subfield content and specification
Coordinate in Y axis	*YCOO		b24	Y-coordinate or latitude
Coordinate in X axis	XCOO		b24	X-coordinate or longitude

B1.5.16 3-D Integer Coordinate List field structure – C3IL

Subfield name	Label	Format	Subfield content and specification
Vertical CRS Id	VCID	b11	Internal identifier of the Vertical CRS
Coordinate in Y axis	*YCOO	b24	Y- coordinate or latitude
Coordinate in X axis	XCOO	b24	X- coordinate or longitude
Coordinate in Z axis	ZCOO	b24	Z - coordinate (depth or height)

B1.5.17 Curve Record Identifier field - CRID

Subfield name	Label	Value	Format	Comment
Record name	RCNM	{120}	b11	{120} - Curve
Record identification number	RCID		b14	Range: 1 to 2 ³² -2
Record version	RVER		b12	RVER contains the serial number of the record edition
Record update instruction	RUIN	{1}	b11	{1} - Insert

B1.5.18 Point Association field - PTAS

Subfield name	Label	Value	Format	Comment
Referenced Record name	*RRNM		b11	Record name of the referenced record
Referenced Record identifier	RRID		b14	Record identifier of the referenced record
Topology indicator	TOPI		b11	{1} - Beginning point {2} - End point {3} - Beginning & End point

B1.5.19 Segment Header field - SEGH

Subfield name	Label	Value	Format	Comment
Interpolation	INTP	{4}	b11	{4} - Loxodromic

B1.5.20 Composite Curve Record Identifier field - CCID

Subfield name	Label	Value	Format	Comment
Record name	RCNM	{125}	b11	{125} - Composite Curve
Record identification number	RCID		b14	Range: 1 to 2 ³² -2
Record version	RVER		b12	RVER contains the serial number of the record edition
Record update instruction	RUIN	{1}	b11	{1} - Insert

B1.5.21 Curve Component field - CUCO

Subfield name	Label	Value	Format	Comment
Referenced Record name	*RRNM		b11	Record name of the referenced record
Referenced Record identifier	RRID		b14	Record identifier of the referenced record
Orientation	ORNT		b11	{1} - Forward {2} - Reverse

B1.5.22 Surface Record Identifier field - SRID

Subfield name	Label	Value	Format	Comment
Record name	RCNM	{130}	b11	{130} - Surface
Record identification number	RCID		b14	Range: 1 to 2 ³² -2
Record version	RVER		b12	RVER contains the serial number of the record edition
Record update instruction	RUIN	{1}	b11	{1} - Insert

B1.5.23 Ring Association field - RIAS

Subfield name	Label	Value	Format	Comment
Referenced Record name	*RRNM		b11	Record name of the referenced record
Referenced Record identifier	RRID		b14	Record identifier of the referenced record
Orientation	ORNT		b11	{1} - Forward {2} - Reverse
Usage indicator	USAG		b11	{1} - Exterior {2} - Interior
Ring Association update instruction	RAUI	{1}	b11	{1} - Insert

B1.5.24 Feature Type Record Identifier field - FRID

Subfield name	Label	Value	Format	Comment
Record name	RCNM	{100}	b11	{100} - Feature type

Record identification number	RCID		b14	Range: 1 to 2 ³² -2
Object code	OBJC		b12	A valid feature type code from the FC
Record version	RVER		b12	RVER contains the serial number of the record edition
Record update instruction	RUIN	{1}	b11	{1} - Insert

B1.5.25 Spatial Association field - SPAS

Subfield name	Label	Value	Format	Comment
Referenced Record name	*RRNM		b11	Record name of the referenced record
Referenced Record identifier	RRID		b14	Record identifier of the referenced record
Orientation	ORNT		b11	{1} Forward {2} Reverse {255} NULL (Not Applicable)
Scale Minimum	SMIN		b14	Denominator of the largest scale for which the feature type can be depicted by the referenced spatial object. If the value is 0 it does not apply.
Scale Maximum	SMAX		b14	Denominator of the smallest scale for which the feature type can be depicted by the referenced spatial object. If the value is 2 ³² -1 it does not apply.
Spatial Association Update Instruction	SAUI	{1}	b11	{1} - Insert

B1.5.26 Feature Association field – FASC

Subfield name	Label	Value	Format	Comment
Referenced Record name	*RRNM		b11	Record name of the referenced record
Referenced Record identifier	RRID		b14	Record identifier of the referenced record
Feature Association Code	ASCD		b12	A valid code for the feature association
Role Code	RLCD		b12	A valid code for the role
Feature Association Update Instruction	FAUI	{1}	b11	{1} - Insert
Attribute label/code	*ATLB		b12	A valid attribute code
Attribute index	ATIX		b12	Index (position) of the attribute in the sequence of attributes with the same code and the same parent (starting with 1).
Parent index	PAIX		b12	Index (position) of the parent complex attribute within this FASC field (starting with 1). If the attribute has no parent (top level attribute) the value is 0.
Attribute Instruction	ATIN		b11	{1} - Insert {2} - Delete {3} - Modify
Attribute value	ATVL		A()	A string containing a valid value for the domain of the attribute specified by the subfields above.

B1.5.27 Theme Association field - THAS

Subfield name	Label	Value	Format	Comment
Referenced Record name	*RRNM		b11	Record name of the referenced record
Referenced Record identifier	RRID		b14	Record identifier of the referenced record
Theme Association Update Instruction	TAUI	{1}	b11	{1} - Insert

B1.5.28 Masked Spatial Type field - MASK

Subfield name	Label	Value	Format	Comment
Referenced Record name	*RRNM		b11	Record name of the referenced record
Referenced Record identifier	RRID		b14	Record identifier of the referenced record
Mask Indicator	MIND	{1} or {2}	b11	{1} – Truncated by the dataset limit {2} – Suppress portrayal
Mask Update Instruction	MUIN	{1}	b11	{1} - Insert

B1.6 Dataset cancellation structure

Dataset cancellation file

```

|
|--<1>- Data Set General Information record
|
|--<1>-DSID (13\\*1): Data Set Identification field

```

B1.6.1 Field Content

B1.6.2 Data Set Identification field - DSID

Subfield name	Label	Value	Format	Comment
Record name	RCNM	{10}	b11	{10} - Data Set Identification
Record identification number	RCID	{1}	b14	Only one record
Encoding specification	ENSP	'S-100 Part 10a'	A()	Encoding specification that defines the encoding
Encoding specification edition	ENED	"1.1"	A()	Edition of the encoding specification
Product identifier	PRSP	"INT.IHO.S-101.1.0"	A()	Unique identifier for the data product as specified in the product specification
Product edition	PRED	"1.0"	A()	Edition of the product specification
Application profile	PROF	"2"	A()	"2" – ER Profile
Dataset file identifier	DSNM		A()	The file name including the extension but excluding any path information
Dataset title	DSTL		A()	The title of the dataset
Dataset reference date	DSRD		A(8)	The reference date of the dataset Format: YYYYMMDD according to ISO 8601
Dataset language	DSLG	"EN"	A()	The (primary) language used in this dataset
Dataset abstract	DSAB	omitted	A()	The abstract of the dataset
Dataset edition	DSED	"0"	A()	0 - indicates the cancellation
Dataset topic category	*DSTC	{14}{18}	b11	A set of topic categories

Annex C – Normative Implementation Guidance

Annex D – Feature Catalogue

Annex F – Portrayal Catalogue