

# INTERNATIONAL HYDROGRAPHIC ORGANIZATION



## IHO UNIVERSAL HYDROGRAPHIC DATA MODEL

**Working Version – May 2012**

**Special Publication No. 101  
Electronic Navigational Chart Product Specification**

### **Appendix A** **Data Classification and Encoding Guide**

Published by the  
International Hydrographic Bureau  
**MONACO**

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**Document Control**

<b>Version</b>	<b>Version Type</b>	<b>Date</b>	<b>Approved By</b>	<b>Signed Off By</b>	<b>Role</b>
0.0.0	Editing Committee Draft	Xxx 2012	TSMAD		TSMAD Chair
0.0.1	Draft Document		TSMAD		TSMAD Chair
0.0.2					



# 1 Overview

## 1.1 Preface

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

The purpose of the Data Classification and Encoding Guide is to facilitate S-101 encoding to meet IHO standards for the proper display of ENC in an ECDIS. The document describes how to encode information that the cartographer considers relevant to an ENC. The content of an ENC is at the discretion of the producing authority provided that the conventions described within this document are followed. A “producing authority” is a Hydrographic Office (HO) or an organization authorized by a government, HO or other relevant government institution to produce ENCs.

The entire S-100 Standard, including the S-101 Product Specification, is available at the following web site, <http://www.iho.int>.

**Comment [j1]:** S-57 Appendix B.1 Annex A contains a statement about conformance with a particular version of the Product Specification. Is such a statement required, or is a new version of the PS going to be published as Appendix A is amended?

## 1.2 S-101 Appendix A; Data Classification and Encoding Guide - Metadata

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

**Title:** The International Hydrographic Organization Electronic Navigation Chart Product Specification, [Appendix A](#) – Data Classification and Encoding Guide

**Version:** 0.0.1

**Date:** [January 2013](#)

**Language:** English

**Classification:** Unclassified

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**URL:** [www.iho.int](http://www.iho.int)

**Identifier:** S-101 [Appendix A](#)

**Maintenance:** Changes to S-101 Annex B; Data Classification and Encoding Guide are coordinated by the IHO Transfer Standard Maintenance and [Application](#) Development Working Group (TSMAD) and must be made available via the IHO web site.

**Comment [j2]:** S-101 contains a reference to an unknown Annex here. Is this required for this document?

## 1.3 Terms, definitions and abbreviations

### 1.3.1 Terms and definitions

#### aggregation

special form of association that specifies a whole-part relationship between the aggregate (whole) and a component (see composition)

#### attribute

named property of an entity

NOTE: Describes the geometrical, topological, thematic, or other characteristic of an entity

#### curve

1-dimensional **geometric primitive**, representing the continuous image of a line

NOTE: [A curve is limited by two points at the beginning and the end of it. If the curve is a loop the curve starts and ends at the same point.](#)

**Comment [j3]:** Example only. Terms and definitions to be determined later on.

#### feature

Abstraction of real world phenomena

NOTE: A feature may occur as a type or an instance. The terms “feature type” or “feature instance” should be used when only one is meant

EXAMPLE: The **feature instance** named “Eiffel Tower” may be classified with other phenomena into a feature type “tower”

#### enumeration

A fixed list of valid identifiers of named literal values. Attributes of an enumerated type may only take values from this list (source: ISO 19136:XX, *Geographic information — Geography Markup Language (GML)*)

#### geometric primitive

geometric object representing a single, connected, homogeneous element of geometry

NOTE: Geometric primitives are non-decomposed objects that present information about geometric configuration. They include **points**, **curves**, surfaces and solids

#### maximum display scale

the larger value of the ratio of the linear dimensions of features of a dataset presented in the display and the actual dimensions of the features represented (largest scale) of the scale range of the dataset

#### minimum display scale

the smaller value of the ratio of the linear dimensions of features of a dataset presented in the display and the actual dimensions of the features represented (smallest scale) of the scale range of the dataset

#### point

0-dimensional geometric primitive, representing a position

NOTE: The **boundary** of a point is the empty set

### 1.3.2 Abbreviations

ENC	Electronic Navigational Chart
GNSS	Global Navigation Satellite System
IHO	International Hydrographic Organization
SENC	System Electronic Navigational Chart
TSMAD	Transfer Standard Maintenance and Application Development Working Group

**Comment [j4]:** Examples only. Complete list of abbreviations to be determined later on.

## 1.4 Use of language

Within this document:

“Must” indicates a mandatory requirement;

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

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

## 1.5 Maintenance

### 1.5.1 Maintenance procedures

~~Changes to the Data Classification and Encoding Guide are coordinated by Transfer Standard Maintenance and Application Development Working Group (TSMAD). Individuals that wish to make changes to the Data Classification and Encoding Guide must address their comments to the TSMAD.~~

~~There are three change proposal types to the Data Classification and Encoding Guide. They are:~~

~~(1) Clarification;~~

~~(2) Revision; and~~

~~(3) New Edition.~~

~~Any change proposal must be one of these types.~~

~~ALL proposed changes must be technically assessed before approval. All proposals must be submitted using S-101 Appendix A Maintenance—Change Proposal Form. See Annex A.~~

~~Approved changes must be issued and entered on the Document Control page of this document.~~

#### **1.5.1.1—Clarification**

~~Clarifications are defined as non-substantive changes to the Data Classification and Encoding Guide. Typically, clarifications: remove ambiguity; correct grammatical and spelling errors; amend or update cross references; and insert improved graphics. A clarification must not cause any substantive semantic change to the document.~~

#### **1.5.1.2—Revision**

~~Revisions are defined as substantive semantic changes to the Data Classification and Encoding Guide. Typically, revisions will change the document to correct factual errors; or introduce necessary changes to ENC encoding guidance that has become evident as a result of practical experience or changing circumstances. A revision must not also be classified as a clarification. Revisions could have an impact on either existing users or future users of the document. All cumulative clarifications must be included with the release of approved revisions.~~

~~In most cases a new Feature or Portrayal Catalogue will result in a revision of the Data Classification and Encoding Guide.~~

#### **1.5.1.3—New Edition**

~~New Editions are significant changes to the Data Classification and Encoding Guide. They can include additional information from the TSMAD or related committees that were not originally included in the Data Classification and Encoding Guide that may be needed for additional applications. A New Edition results in a new major version of the Data Classification and Encoding Guide. One New Edition may result in multiple related actions. All cumulative clarifications and revisions must be included with the release of an approved New Edition.~~

### **1.5.2—Version control**

~~The TSMAD must release new versions of the Data Classification and Encoding Guide as necessary. New versions must include clarifications, revisions and New Editions. Each version must contain a change list that identifies the changes between versions of the Data Classification and Encoding Guide.~~

#### **1.5.2.1—Clarification version control**

~~Clarifications must be denoted as 0.0.x. Each clarification or set of clarifications approved at a single point in time must increment x by 1.~~

#### **1.5.2.2—Revision version control**

~~Corrections must be denoted as 0.x.0. Each correction or set of revisions approved at a single point in time must increment x by 1. Revision version control will set clarification version control to 0.~~

#### **1.5.2.3—New Edition version control**

~~New Editions must be denoted as x.0.0. Each New Edition approved at a single point in time must increment x by 1. New Edition version control will set the clarification and revision version control to 0.~~

## 2 General

The S-101 Data Classification and Encoding Guide is designed to permit the transfer of data describing the real world. The real world is far too complex for a complete description to be practical; therefore a simplified, highly specific, view of the real world must be used. This is achieved by modelling the reality. Detailed information is available on IHO Special Publication No. S-57, Edition 3.1, November 2000 "IHO Transfer Standard for Digital Hydrographic Data" within several annexes and appendices.

The IHO S-57 Standard is organized in three parts. They are:

Part 1: Introduction

Part 2: Theoretical data model on which the standard is based

Part 3: Defines Data Structure/format that is used in implement and encoding rules

Appendix A: The Object Catalogue

Appendix B: IHO approved Product Specifications

**Comment [J5]:** Should this be a description of the S-100 Standard?

This standard is specifically concerned with those entities in the real world that are of relevance to hydrography. This hydrographic regime is considered to be geo-spatial. As a result, the model defines real world entities as a combination of descriptive and spatial characteristics. Within the model these sets of characteristics are defined in terms of feature, spatial and information types. A type is defined as a stereotype of class that is used to specify a domain of instances (objects) together with the operations applicable to the objects. A type may have attributes and may be related to other types.

### 2.1 Feature types

Feature types contain descriptive attributes and do not contain any geometry (i.e. information about the geometric primitive and position of a real world entity). Spatial types may have descriptive attributes and must contain geometry.

A feature instance is located by a relationship to one or more spatial instances. A feature instance may exist without referencing a spatial instance, but each spatial instance must be referenced by a feature instance.

To facilitate the efficient exchange of the non-locational description of real world entities, this model defines the following feature types:

**Meta feature type** - contains information about other features.

**Cartographic Feature type** - contains information about the cartographic representation (including text) of real world entities. No cartographic features are currently included in S-101.

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

**Aggregated feature type** – are features that are made up of component features.

**Theme feature type** – contains a collection of thematically grouped features. An example of a theme feature type is the Skin Of The Earth theme.

#### 2.1.1 Multiple features

On some sources, multiple features in close proximity are generalised to a single feature with a text string indicating the presence of the other features. In such cases, one feature of the appropriate class should be encoded and the true number of features should be encoded using the complex attribute information, sub-attribute text (e.g. 3 chimneys) on this feature. If the true number of features is not known, the text "more than one" should be encoded using information (text).

For the encoding of multiple, identical lights using the attribute multiplicity of lights, see table in clause X.X.

For the encoding of leading lights that are merged on the source document, see clause X.X.

### 2.2 Spatial types

Spatial types may have descriptive attributes and must contain geometry. Allowable geometric primitives are point (P), curve (C) and surface (S). In Table 2.1 below, a feature having no allowable geometric primitive is annotated as none (N).

Each spatial instance must be referenced by a feature instance.

The allowable geometric primitive for each feature type is defined in the Feature Catalogue. Within this document, allowable primitives are included in the description of each feature type. For easy reference, Table 2.1 below summarises the allowable geometric primitives for each feature type:

**Comment [A6]:** This is not a section in the Product Specification – should it be? This section needs to be expanded.

Administration Area			S
Anchorage Area	P		S
Beacon Cardinal	P		
Beacon Safe Water	P		
Bridge	P	C	S
Buoy Cardinal	P		
Buoy Lateral	P		
Cable Area			S
Canal		C	S
Caution Area	P		S
Coastline		C	
Control Point	P		
Current – Non-gravitational	P		S
Daymark	P		
Depth Area		C	S
Dock Area			S
Dumping Ground	P		S
Fairway			S
Fishery Zone			S
Floating Dock	P	C	S
Foul Ground	P	C	S
Gridiron	P		S
Hulk	P		S
Inshore Traffic Zone			S
Land Elevation	P	C	
Light Air Obstruction	P		
Light Float	P		
Light Vessel	P		
Log Pond	P		S
Military Practice Area	P		S
Obstruction	P	C	S
Oil Barrier		C	
Pingo	P		S
Pipeline Overhead		C	
Precautionary Area	P		S
Radar Line		C	
Radar Station	P		
Radio Station	P		
Recommended Route Centreline		C	
Rescue Station	P		
River		C	S
Sandwave	P	C	S
Seaplane Landing Area	P		S
Signal Station Warning	P		
Sloping Ground	P		S
Span		C	S
Submarine Transit Lane			S
Tide Stream – Flood/Ebb	P		S
Tide Stream Panel Data	P		S
Tide – Non-Harmonic Prediction	P		S
Topmark	P		
Traffic Separation Scheme Crossing			S
Traffic Separation Zone			S
Underwater/Awash Rock	P		
Water Turbulence	P	C	S
Weed/Kelp	P		S

Airport/Airfield	P		S
Archipelagic Sea Lane			S
Beacon Isolated Danger	P		
Beacon Special Purpose	P		
Building	P		S
Buoy Installation	P		
Buoy Safe Water	P		
Cable Overhead	P	C	S
Cargo Transshipment Area	P		S
Checkpoint	P		S
Contiguous Zone			S
Conveyor		C	S
Custom Zone			S
Deep Water Route Centreline		C	
Depth Contour		C	
Dredged Area			S
Dyke		C	S
Fence/Wall		C	
Fishing Facility	P	C	S
Fog Signal	P		
Free Port Area			S
Harbour Area (Administrative)			S
Ice Area			S
Lake			S
Land Region	P		S
Light All Around/Single Sector	P		
Light Fog Detector	P		
Local Magnetic Anomaly	P	C	S
Magnetic Variation	P	C	S
Mooring/Warping Facility	P	C	S
Offshore Platform	P		S
Pile	P	C	
Pilotage District			S
Pipeline Submarine/On Land		C	
Production/Storage Area	P		S
Radar Range			S
Radar Transponder Beacon	P		
Railway		C	
Recommended Track		C	
Restricted Area			S
Road	P	C	S
Sea Area/Named Water	P		S
Shoreline Construction	P	C	S
Silo/Tank	P		S
Small Craft Facility	P		S
Spring	P		
Swept Area			S
Tide Stream – Harmonic Prediction	P		S
Tide Stream – Time Series	P		S
Tide – Time Series	P		S
Traffic Separation Line		C	
Traffic Separation Scheme Lane Part			S
Tunnel	P	C	S
Unsurveyed Area			S
Waterfall	P	C	
Wreck	P		S

Anchor Berth	P		S
Archipelagic Sea Lane Axis		C	
Beacon Lateral	P		
Berth	P	C	S
Built-up Area	P		S
Buoy Isolated Danger	P		
Buoy Special Purpose	P		
Cable Submarine		C	
Causeway		C	S
Coastguard Station	P		
Continental Shelf Area			S
Crane	P		S
Dam	P	C	S
Deep Water Route Part			S
Distance Mark	P		
Dry Dock			S
Exclusive Economic Zone			S
Ferry Route		C	S
Fishing Ground			S
Fortified Structure	P	C	S
Gate	P	C	S
Harbour Facility	P		S
Incineration Area	P		S
Land Area	P	C	S
Landmark	P	C	S
Light Directional	P		
Light Multi-sector	P		
Lock Basin			S
Marine Farm/Culture	P	C	S
Navigation Line		C	
Offshore Production Area			S
Pilot Boarding Place	P		S
Pipeline Area	P		S
Pontoon	P	C	S
Pylon/Bridge Support	P		S
Radar Reflector	P		
Radio Calling-in Point	P	C	
Rapids	P	C	S
Recommended Traffic Lane Part	P		S
Retroreflector	P		
Runway	P	C	S
Seabed Area	P	C	S
Signal Station Traffic	P		
Slope Topline		C	
Sounding	P		
Straight Territorial Sea Baseline		C	
Territorial Sea Area			S
Tide Stream – Non-harmonic Prediction	P		S
Tide – Harmonic Prediction	P		S
Tideway		C	S
Traffic Separation Scheme Boundary		C	
Traffic Separation Scheme Roundabout			S
Two-way Route Part			S
Vegetation	P		S
Vessel Traffic Service Area			S
Quality of Non-Bathymetric Data			S

**Comment [A7]:** Extension 6/01

**Comment [A8]:** Extension 6/01



- EN Enumeration:** A fixed list of valid identifiers of named literal values. Attributes of an enumerated type may only take values from this list.
- BO Boolean:** A value representing binary logic. The value can be either *True* or *False*. The default state for Boolean type attributes (i.e. where the attribute is not populated for the feature) is *False*.
- RE Real:** A signed Real (floating point) number consisting of a mantissa and an exponent. The representation of a real is encapsulation and usage dependent.  
Examples: 23.501, -0.0001234, -23.0, 3.141296
- IN Integer:** A signed integer number. The representation of an integer is encapsulation and usage dependent.  
Examples: 29, -65547
- TE Free text:** A `CharacterString`, that is an arbitrary-length sequence of characters including accents and special characters from a repertoire of one of the adopted character sets.
- DA Date:** A date provides values for year, month and day according to the Gregorian Calendar. 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. See clause X.X.
- TI Time:** 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.  
Time zone according to UTC is optional.  
Example: 183059 or 183059+0100 or 183059Z  
The complete representation of the time of 27 minutes and 46 seconds past 15 hours locally in Geneva (in winter one hour ahead of UTC), and in New York (in winter five hours behind UTC), together with the indication of the difference between the time scale of local time and UTC, are used as examples.  
Geneva: 1527460100  
New York: 1527460500
- DT 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 (see DA and TI above and clause X.X).  
Example: 19850412T101530

#### 2.4.2 Mandatory attributes

Within this document, mandatory attributes (cardinality 1,1; 1,n (n>1); or 1,\*) are identified in the description of each feature type. For easy reference, Table 2.2 below summarises the mandatory attributes for each feature type:

Feature	Attributes
Administration Area (Named)	jurisdiction
Archipelagic Sea Lane	nationality
Archipelagic Sea Lane Axis	nationality
Beacon Cardinal	beacon shape   category of cardinal mark   colour
Beacon Isolated Danger	beacon shape   colour
Beacon Lateral	beacon shape   category of lateral mark   colour
Beacon Safe Water	beacon shape   colour
Beacon Special Purpose/General	beacon shape   category of special purpose mark   colour
Berth	feature name
Bridge	over navigable water: category of bridge other cases: none
Buoy Cardinal	buoy shape   category of cardinal mark   colour
Buoy Installation	buoy shape   colour
Buoy Isolated Danger	buoy shape   colour
Buoy Lateral	buoy shape   category of lateral mark   colour

Feature	Attributes
Buoy Safe Water	buoy shape colour
Buoy Special Purpose/General	buoy shape category of special purpose mark colour
Cable Overhead	over navigable water: clearance vertical other cases: none
Caution Area	at least one of: information textual description
Contiguous Zone	nationality
Continental Shelf Area	nationality
Conveyor	over navigable water: clearance vertical other cases: none
Current – Non-gravitational	current velocity orientation
Customs Zone	nationality
Daymark	colour topmark shape
Deep Water Route Centreline	category of recommended track orientation traffic
Deep Water Route Part	depth range minimum value orientation traffic
Depth Area	depth range maximum value depth range minimum value
Depth Contour	value of depth contour
Dredged Area	depth range minimum value
Exclusive Economic Zone	nationality
Ferry Route	category of ferry
Fishery Zone	nationality
Fog Signal	category of fog signal
Gate	if navigable at maximum display scale for the data: clearance horizontal
Harbour Facility	category of harbour facility
Ice Area	category of ice
Land Elevation	elevation
Land Region	at least one of: category of land region feature name
Landmark	category of landmark visually conspicuous
Light All Around/Single Sector	category of light colour rhythm of light
Light Directional	colour orientation rhythm of light
Light Multi-sector	light sector rhythm of light
Light Float	colour
Light Vessel	colour
Local Magnetic Anomaly	value of local magnetic anomaly
Magnetic Variation	reference year for magnetic variation value of annual change in magnetic variation value of magnetic variation
Marine Farm/Culture	water level effect at least one of: value of sounding height
Mooring Facility	category of mooring facility
Navigation Line	category of navigation line orientation
Obstruction	water level effect at least one of: value of sounding height
Pilotage District	at least one of: information textual description
Pipeline Overhead	over navigable water: clearance vertical other cases: none
Precautionary Area	at least one of: information textual description

Comment [A10]: MD8 –  
2.Co.8



Feature	Attributes
Production Area	category of production area
Pylon/Bridge Support	category of pylon
Radio Calling-in Point	orientation traffic
Radar Line	orientation
Radar Transponder Beacon	category of radar transponder beacon
Recommended Route Centreline	category of recommended track
Recommended Track	category of recommended track orientation traffic
Recommended Traffic Lane Part	orientation
Restricted Area	at least one of: category of restricted area restriction
Sea Area/Named Water Area	at least one of: category of sea area feature name
Seabed Area	surface quality
Signal Station Traffic	category of signal station traffic
Signal Station Warning	category of signal station warning
Small Craft Facility	category of small craft facility
Span	clearance vertical
Straight Territorial Sea Baseline	nationality
Swept Area	depth range minimum value
Territorial Sea Area	nationality
Tidal Stream – Harmonic Prediction	tide – method of tidal prediction tide – value of harmonic constituents
Tidal Stream – Non-harmonic Prediction	tide – method of tidal prediction tide – time and height differences
Tidal Stream – Time Series	time range tidal stream, current – tide series values tide, current – time interval of values
Tide – Harmonic Prediction	tide – method of tidal prediction tide – value of harmonic constituents
Tide – Non-harmonic Prediction	tide – method of tidal prediction tide – time and height differences
Tide – Time Series	time range tide – high and low water values
Tide Stream – Flood/Ebb	category of tidal stream current velocity orientation
Tide Stream Panel Data	tidal stream – reference station data tidal stream values
Topmark	topmark-shape
Traffic Separation Scheme Lane Part	orientation (except when the lane part is a junction)
Two-way Route Part	orientation traffic
Underwater Rock	value of sounding water level effect
Vegetation	category of vegetation
Water Turbulence	category of water turbulence
Wreck	water level effect at least one of: category of wreck value of sounding
Compilation-scale-of-data	compilation-scale
Data Coverage	category of coverage
Horizontal Datum Shift Parameters	horizontal datum shift parameters
Navigational System of Marks	one of: marks navigational – system of or orientation
Quality of Bathymetric Data	category of temporal variation features detected full seafloor coverage survey date range
Quality of Non-bathymetric Data	positional uncertainty
Quality of Survey	features detected full seafloor coverage survey authority survey data range survey type

Comment [A11]: MD8 –  
1.Co.23 and 1.Cl.30

Feature	Attributes
Sounding Datum	vertical datum
Update Information	update description
Vertical Datum	vertical datum

Table 2.2 Mandatory attributes

**NOTE 1:** Compilers should refer to Table 2.2 above when determining the attributes considered to be mandatory for any feature being encoded. In the Tables below describing each feature and its attributes, mandatory attributes are identified with a cardinality value of “1,1” “1,n” (n>1); or “1,\*”. Note that sub-attributes of complex attributes, as well as the complex attribute itself, may also be designated as mandatory. “Conditional” mandatory attributes are not identified in the Tables below other than by comments in the Remarks for the relevant feature, but are indicated in Table 2.2 above by the following additional text:

over navigable water	for Bridge, Cable Overhead, Conveyor, Pipeline Overhead
at least one of	for Caution Area, Land Region, Marine Farm/Culture, Obstruction, Pilotage District, Restricted Area, Seabed Area, Sea Area/Named Water Area, Wreck
if navigable at....	for Gate
if it is.....	for Light
except when.....	for Traffic Separation Scheme Lane Part
one of ... or ...	for Navigational System of Marks

Compilers must consider these conditional circumstances when encoding features for ENC, as well as any additional information given in the object class descriptions in this document. For example, when encoding a **Restricted Area**, the mandatory attributes are *at least one of* category of restricted area or restriction – if restriction is known but category of restricted area is not known, then category of restricted area must not be populated with an empty (null) value, as it is not mandatory in this case.

**NOTE 2:** The attribute **colour pattern** is mandatory for any feature (except **Light**) that has more than one value populated for the attribute **colour**.

**Comment [j12]:** AU S-57  
Encoding Guide

#### 2.4.3 Missing attribute values

In a base dataset (**EN application profile**), when an attribute code is present but the attribute value is missing, it means that the producer wishes to indicate that this attribute value is unknown.

In a revision dataset (**ER application profile**), when an attribute code is present but the attribute value is missing it means:

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

#### 2.4.4 Textual information

The complex attributes **information** and **textual description** must not be used when it is possible to encode the information by means of any other attribute.

**information** contains information as text using the sub-attribute **text**, whereas **textual description** encodes the name of an external file using the sub-attribute **file reference**.

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

The files referenced by **textual description** sub-attribute **file reference** must be .TXT, .HTM or .XML files, and may contain formatted text. These files should generally be used for longer texts (e.g. longer chart notes, tables or paragraphs from **nautical publications**). It is up to the **Producing Authority** to determine the most suitable means of encoding a particular piece of text.

The exchange language must be English. Other languages may be included as an additional option, defined by population of the sub-attribute **language** for an iteration of the complex attributes **feature name**, **information** and

**textual description.** In general this means that, when a national language is used, the English translation must also exist in a separate iteration of the relevant textual information attribute(s).

**Remarks:**

- Clause X.X of the S-101 Product Specification specifies the content of an ENC exchange set, including the option to include text files.
- In some cases, for external files referenced by the attribute **textual description** with sub-attribute **language** populated as a language other than English, encoders have created text files using local character encoding that may not be interpreted correctly by an ECDIS and therefore not readable by the user. Encoders **must** encode national text files (files referenced by the sub-attribute **file reference**) using UTF-8 character encoding. This means that the encoding of the characters in text files must match the encoding of other textual national attributes (i.e. **feature name**, **information** with value other than English populated for sub-attribute **language**) within the data set.

#### 2.4.5 Dates

When encoding dates using the attributes **compilation-date**, **date range**, **source date** and **survey date range**, and no specific year, month or day is required, the following values must apply in conformance to ISO 8601:1988.

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

Notes: CCYY = calendar year; MM = month; DD = day.  
In the first two values, the dashes (--) must be included.

##### 2.4.5.1 Seasonal features

If it is required to show seasonality of **features**, it must be done using the attribute **Status** = 5 (periodic/intermittent). If it is required to encode the start and/or end dates of the season, this must be done using the complex attribute **date range**, with sub-attribute **periodic** = **True**.

#### 2.4.6 Times

If it is required to show the beginning and end of the active period of a feature, it must be encoded using the complex attribute **time range**, sub-attributes **time end** and **time start**. When using these sub-attributes, all times **must** be encoded as Coordinated Universal Time (UTC). The attribute definition for **time end** and **time start** (see clause X.X) states that the mandatory format is CCYYMMDDThhmmss, where T is the separator, and this format **must** be used.

#### 2.4.7 Colours and colour patterns

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

- For horizontal stripes (**colour pattern** = 1), the first colour in the list must be the top-most, and subsequent colours follow sequentially from top to bottom. For example, **colour** = 3,1 to encode a red stripe above a white stripe.
- For vertical stripes (**colour pattern** = 2), the first colour in the list must be the left-most, and subsequent colours follow sequentially from left to right. For example, **colour** = 3,1,3 to encode red, white, red vertical stripes.
- For diagonal stripes (**colour pattern** = 3), the first colour in the list must be the top-left-most, and subsequent colours follow sequentially from top left to bottom right. For example, **colour** = 1,3,1,3,1 to encode white, red, white, red, white diagonal stripes.
- For squares (**colour pattern** = 4), the first colour in the list must be the top-left-most square. Subsequent colours follow sequentially from left to right along the top row then repeated for subsequent rows until the bottom right-most square is reached. For example, **colour** = 1,3,3,1 to encode white, red squares on the top row and red, white squares on the bottom row.
- For border stripes (**colour pattern** = 6), the first colour in the list must be the border stripe, the second colour must be that of the background. For example, **colour** = 3,1 to encode a red border stripe on a white background. Where a border stripe is combined with other patterns, the border stripe colour must be the first colour in the list, and subsequent colours must be interpreted in accordance with the rules defined for the

additional patterns. Therefore, if a pattern contains a border stripe as well as other patterns, the border stripe must be the first value in the list of **colour pattern**.

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

#### 2.4.8 Radar conspicuous **features** (see S-4 – B-485.2)

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

##### Remarks:

- If it is required to encode a **feature** which has no radar reflector, but is radar conspicuous, it must be indicated using attribute **radar conspicuous**.
- If it is required to encode a **surface** or point **feature** which is radar conspicuous because it is fitted with a radar reflector, it must be indicated using **radar conspicuous** on the **feature**.
- If it is required to encode radar reflectors on **curve features** (e.g. overhead cables), this must be done using the **feature Radar Reflector** (see clause X.X).

#### 2.4.9 Spatial attributes

Some attributes qualify the location of a **feature**, as opposed to defining the characteristics of the individual **feature** itself.

Attributes specifying the accuracy and quality of a position (x,y - coordinates) are considered to be attributes of **spatial types**.

Within an S-101 compliant dataset, the attributes of **spatial types** are held in the **Spatial Quality information type**.

### 2.5 Datasets

#### 2.5.1 Units

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

#### 2.5.2 Coordinate multiplication factor

Latitude and longitude coordinates (stored in decimal degrees) should be held in ENC production systems at a resolution of 0.0000001 ( $10^{-7}$ ). Therefore the coordinate multiplication factor stored in the CMFX and CMFY subfield values in the Data Set **Structure Information** field must be set to 10000000 ( $10^7$ ) for all datasets.

#### 2.5.3 Seamless ENC coverage

There must be no gaps in data between adjoining **datasets** of the same **maximum display scale**. Similarly, there must be no overlapping data between **datasets** of the same **maximum display scale** (see S-101 Product Specification, clause 11.3.1), except at the agreed adjoining national data limits, where, if it is difficult to achieve a perfect join, a 5 metre overlapping buffer zone may be used.

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

In areas which include neighbouring producer nations, Hydrographic Offices should co-operate to agree on **dataset** boundaries and ensure no data overlap for a **maximum display scale**. Where possible, adjoining nations should agree on common data boundaries within a technical arrangement based on cartographic convenience and benefit to the mariner. Suitable communications between neighbouring nations should be put in place to ensure data consistency across **dataset** boundaries. These should include exchange mechanisms to allow access to each other's ENCs.

#### 2.5.4 Feature Object Identifiers

Clause 4.4 of the S-101 Product Specification provides guidance on the indication of unique world-wide identifiers for ENC features through the population of the Feature Object Identifier (FOID) field. Incorporated in this guidance is advice that the FOID may be used to identify multiple instances of the same feature, with examples listed of the same feature appearing in different maximum display scale datasets, or a feature being split by the ENC dataset structure within the same maximum display scale.

Where a real-world feature has multiple parts within a single ENC dataset due to the ENC dataset structure, the FOID should be repeated for each part of the feature in the cell. Where this occurs, all parts of the geo feature in the dataset must be identical, i.e. same feature class and attribute values and they must not be a component of a collection object or a master/slave relationship. Similarly, where a real-world feature is repeated in datasets of different maximum display scale, the FOID should be repeated for each instance of the feature across the maximum display scale range. Where this occurs, all instances of the geo feature must be identical, i.e. same feature class and attribute values.

#### 2.5.5 180° Meridian of Longitude

Datasets may cross the 180° meridian of longitude.

#### 2.5.6 Minimal depiction areas

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

##### 2.5.6.1 Wide blank areas

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

Producing Authorities should not leave "holes" in Data Coverage features in smaller maximum display scale coverage, under the assumption that the ECDIS user will have the larger maximum display scale data available.

##### 2.5.6.2 Simplified or minimum depiction areas

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

Where larger scale coverage is available:

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

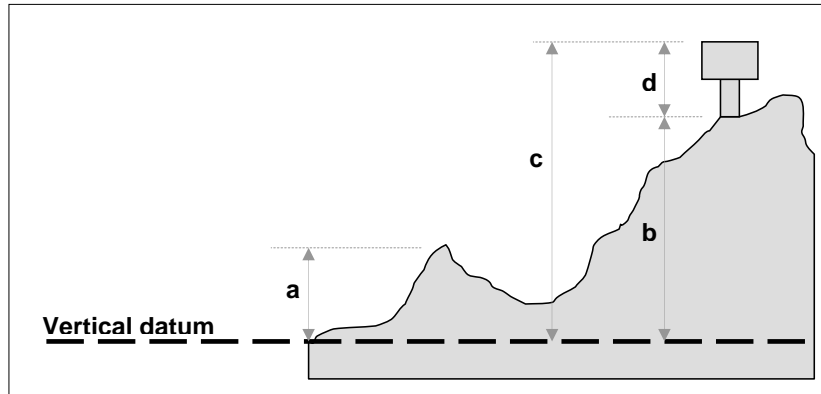
Any other relevant information contained in chart notes pertaining to the area should be incorporated within, or replace completely, the above statement.

Where no larger scale coverage is available:

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

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

### 2.5.7 Heights and elevations



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

For artificial features (e.g. landmarks, buildings) or trees:

- If it is required to encode the altitude of the ground level at the base of the **feature above a vertical datum**, it must be done using **elevation** (figure (b)).
- If it is required to encode the altitude of the highest point of the **feature above a vertical datum**, it must be done using the attribute **height** (figure (c)).
- If it is required to encode the height of the **feature above ground level** (i.e. not associated with a vertical datum), it must be done using the attribute **vertical length** (figure (d)).

### 2.5.8 Geographic names

If it is required to encode an international or national geographic name, it must be done using **complex** attribute **feature name** (see clause X.X).

When possible, existing **features** (e.g. **Built-Up Area**, **River**, navigational marks) should be used to carry this information.

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

National geographic names can be left in their original national language in a **non-English iteration of the sub-attribute feature name** (but only if the national language can be expressed using lexical level 0 or 1), or transliterated or transcribed and used in an **English iteration of the sub-attribute feature name**, in which case the national name should be populated in an **additional iteration of the feature name** with sub-attribute **language** populated with the relevant national language value in accordance with ISO 639-3.

Geographic names should be encoded using **feature name** based on the following criteria and at the Producing Authority's discretion:

1. Named points or capes that do not contain navigational aids should be encoded as **Land Region features** (of type **surface** or **point**), with the geographic name encoded using **feature name**.
2. Named points or capes that contain one navigational aid should be encoded using **feature name** on the **structure feature** associated with the navigational aid. If more than one navigational aid exists on the point or cape or if the point or cape and the structure feature have different names, a **Land Region feature** (of type **surface** or **point**) should be encoded, with the geographic name of the point or cape encoded using **feature name**.
3. A group of hydrographic **features** (e.g. **Seabed Area**, **Underwater/Awash Rock**, **Obstruction**), associated with a particular geographic name, should have the name encoded using **feature name** on a **Sea Area/Named**

**Water Area feature** (of type **surface** or point). The name should not be encoded on the individual hydrographic features.

4. A major island name close to primary shipping corridors should be encoded using **feature name** on the **Land Area feature** delimiting the island. A group of islands associated with a geographic name should have the name encoded using **feature name** on a **Land Region feature** (of type **surface** or point).
5. A named island group or archipelago should be encoded using **feature name** on a **Land Region feature** (of type **surface** covering the area of the island group, or of type **point** in the centre of the island group). Where individual islands within the group are named, these should be encoded using **feature name** on the **Land Area feature** delimiting the island.
6. Named features listed in **Hydrographic Office's** Sailing Directions that may assist in navigation should be encoded using **feature name** on the relevant **feature** (e.g. **Land Region, Underwater/Awash Rock, Seabed Area, Sea Area/Named Water Area, Obstruction**).
7. If it is required to encode an administrative area of international, national, provincial or municipal jurisdiction that may have legal inference, it must be done using an **Administration Area (Named) feature**, with the name encoded using **feature name**.
8. If it is required to encode a major city along the coast, it must be done using **Built-Up Area** or **Administration Area (Named) features** (see clause X.X), with the name encoded using **feature name**.
9. If it is required to encode the name of a navigable river, lake or canal, it must be done using a **Sea Area/Named Water Area feature**, with the name encoded using **feature name**.

In all instances, if the exact extent of the feature to be named is known, a **surface feature** must be created. If the exact extent is not known, an existing or specifically encoded point **feature** should be used to encode the geographic name.

## 2.6 Description of table format for S-101 meta and geo features

### X.X Clause heading

<u>IHO Definition:</u> <b>FEATURE:</b> Definition. (Source of definition).				
<b>S-101 Geo Feature:</b> Feature (S-57 Acronym) S-101 feature and corresponding S-57 acronym				
<b>Primitives:</b> 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-101 Attribute	S-57 Acronym	Allowable Encoding Value *	Type	Multiplicity
Category of bear		1 : papa 2 : mama 3 : baby	EN	1,1
This section lists the full list of allowable attributes for the S-101 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 corresponding S-57 attribute acronym. A blank cell indicates no corresponding S-57 acronym.	This section lists the allowable encoding values for S-101 (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.
Date range			C	0,1
Date range end	(DATEND)		(S) DA	0,1
Date range start	(DATSTA)		(S) DA	0,1
<p><u>INT 1 Reference:</u> The INT 1 location(s) of the Feature – by INT1 Section and Section Number.</p> <p><b>X.X.X Sub-clause heading(s) (see S-4 – B-YYY.Y)</b></p> <p>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.</p> <p>Specific instructions to encode the feature.</p> <p><u>Remarks:</u></p> <ul style="list-style-type: none"> <li>Additional encoding guidance relevant to the feature.</li> </ul> <p><b>X.X.X.X Sub-sub-clause heading(s) (see S-4 – B-CCC.C)</b></p> <p>Clauses related to specific encoding scenarios for the Feature. (Not required for all Features).</p> <p><u>Remarks:</u></p> <ul style="list-style-type: none"> <li>Additional encoding guidance relevant to the scenario (only if required).</li> </ul> <p><u>Distinction:</u> List of features in the Product Specification distinct from the Feature.</p>				

\* For (E) type attributes, the enumerates listed are only those allowable for the particular occurrence 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-101 Feature Catalogue. The full list of enumerates that may be assigned to an attribute can be found in Chapter XX – Attribute and Enumerate Descriptions – of this document.



### 3 ENC Metadata

The maximum use must be made of meta features to reduce the attribution on individual **features**. In a base dataset (EN Application profile, see clause X.X), some meta features are mandatory.

These meta features are in the following list:

**Data Coverage:** In order to assist in data discovery, the meta feature **Data Coverage** must be used to provide coverage of the part of the **dataset** covered by Group 1 features. See clause X.X.

**Navigational System of Marks:** The meta feature **Navigational System of Marks**, with the attribute **marks navigational – system of** (to indicate the system of navigational marks), must provide an exhaustive non-overlapping coverage of the part of the **dataset** containing data. However, other **Navigational System of Marks** features with the attribute **orientation** (to indicate a local direction of buoyage) may overlap these **features**. See clause X.X.

**Quality of Bathymetric Data:** The meta feature **Quality of Bathymetric Data** defines areas within which uniform assessment exists for the quality of bathymetric data, and is used to provide an assessment of the overall quality of bathymetric data to the mariner. Areas of a **dataset** containing depth data or bathymetry must be covered by one or more **Quality of Bathymetric Data** features, which must not overlap. See clause X.X.

### 3.1 Quality of non-bathymetric data

**IHO Definition:** **QUALITY OF NON-BATHYMETRIC DATA.** An area within which the best estimate of the overall accuracy of the data is uniform. The overall accuracy takes into account for example the source accuracy, chart scale, digitising accuracy etc. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.208, November 2000).

**S-101 Geo Feature:** **Quality of non-bathymetric data (M\_ACCY)**

**Primitives:** **Surface**

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of temporal variation		1 : unassessed 2 : event 3 : likely to change 4 : unlikely to change	EN	0,1
Horizontal distance uncertainty	(HORACC)		RE	0,1
Orientation uncertainty			RE	0,1
Positional uncertainty	(POSACC)		RE	1,1
Survey date range			C	0,1
Date end	(SUREND)	ISO 8601:1988	(S) DA	0,1
Date start	(SURSTA)	ISO 8601:1988	(S) DA	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

**INT 1 Reference:**

#### 3.1.1 Quality of positions

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

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

**horizontal distance uncertainty**, **quality of position** and **positional uncertainty** must not be applied to the **spatial type** of any geo feature if they are identical to the **horizontal distance uncertainty**, **quality of position** and **positional uncertainty** values of the underlying meta object.

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

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

Meta features **Quality of Non-bathymetric Data** and **Quality of Bathymetric Data** should not overlap.

Remarks:

- No remarks.

### 3.1.2 Horizontal accuracy

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

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

Remarks:

- No remarks.

### 3.1.3 Vertical accuracy

If it is required to encode the accuracy of a vertical clearance (complex attribute **clearance vertical**), it must be done using the sub-attribute **vertical uncertainty**.

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

Remarks:

- No remarks.

### 3.1.4 Source of non-bathymetric data

The source of non-bathymetric information should be encoded using both the attributes **source indication** and **source date** on the individual **features**, but only if this information is considered to be useful to the mariner.

Remarks:

- No remarks.

Distinction: Quality of data; **quality of survey**.

**3-2** **Compilation scale of data**

**Comment [A13]:** TSMAD23:  
Remove from S-101 and replace  
with Data Coverage features.

**IHO Definition: COMPILATION SCALE OF DATA.** An area within which the data was originally compiled at a uniform scale. For example, it may define the scale of the paper chart from which the data was digitised. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.209, November 2000).

**S-101 Geo-Feature: Compilation Scale of Data (M\_CSCL)**

**Primitives:** Surface

*Real-World*

*Paper-Chart-Symbol*

*EGDIS-Symbol*

S-101-Attribute	S-57 Acronym	Allowable-Encoding Value	Type	Multiplicity
Compilation-scale	(CSGAL)		IN	1,1
Information			C	0,*
— Language		ISO-639-3	(S)-TE	0,1
— Text	(INFORM)		(S)-TE	1,1
Textual-description			C	0,*
— File-reference	(TXTDSC)		(S)-TE	1,1
— Language		ISO-639-3	(S)-TE	0,1
Scale-minimum	(SCAMIN)		IN	0,1
Recording-date	(RECDAT)	ISO-8601:1988	DA	0,1
Recording-indication	(RECIND)		TE	0,1
Source-indication			C	0,*
— Authority			(S)-TE	1,1
— Nationality			(S)-TE	1,1
— ID-code			(S)-TE	0,1
— Source			(S)-TE	0,1
— Source-date	(SORDAT)	ISO-8601:1988	(S)-DA	1,1

**INT-1 Reference:**

**3.2.1 — Compilation scale**

The compilation scale is considered to be the maximum display scale of ENC data, expressed as the "maximum display scale for the ENC data".

The default value for the entire dataset must be given in the "Compilation Scale of Data" [CSCL] subfield of the "Data-Set-Parameter" [CRSH] field. The default value should be the compilation scale appropriate to the greater part of the data in the dataset.

If the compilation scale for an area is different to the value given in the CSCL subfield for the dataset, it must be encoded using the meta-feature **Compilation Scale of Data**. The areas covered by these meta-features must not overlap.

Compilation scales for ENCs must be based upon standard radar ranges:

Selectable-Range	Standard-scale (rounded)
200-NM	1:3000000
96-NM	1:1500000
48-NM	1:700000

**Comment [J14]:** Will need to  
be re-written in regard to new  
implementation of maximum,  
minimum and optimum scale values.

24NM	1:350000
12-NM	1:180000
6-NM	1:90000
3-NM	1:45000
1.5-NM	1:22000
0.75-NM	1:12000
0.5-NM	1:8000
0.25-NM	1:4000

Normally, the nearest larger standard scale must be used, e.g. an ENC produced from a 1:25000 paper chart must normally have a compilation scale of 1:22000.

Exceptionally, if source material permits, the next larger scale may be used.

Where the source scale is larger than 1:4000 or smaller than 1:3000000 then the actual scale should be used.

Remarks:

- The compilation scale provides the reference value for the overscale indication on an ECDIS.
- The use of too many **Compilation Scale of Data** features within the same ENC dataset should be avoided. The values for the attribute **compilation scale** of any **Compilation Scale of Data** feature must be populated using the same criteria as those used for setting the default compilation scale for the dataset.

Distinction:

### 3.3 Data Coverage

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

#### S-101 Geo Feature: Data Coverage (M\_COVR)

**Primitives:** Surface

Real World		Paper Chart Symbol	ECDIS Symbol		
S-101 Attribute		S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category-of-coverage		(CATGOV)	1-: coverage-available 2-: no-coverage-available	EN	1,1
Maximum display scale		(CSCALE)	maximum display scale < minimum display scale	IN	1,1
Minimum display scale			minimum display scale > maximum display scale	IN	0,1
Information				C	0,*
Language			ISO 639-3	(S) TE	0,1
Text		(INFORM)		(S) TE	1,1
Recording date		(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication		(RECIND)		TE	0,1
Source indication				C	0,*
Authority				(S) TE	1,1
Nationality				(S) TE	1,1
ID code				(S) TE	0,1
Source				(S) TE	0,1
Source date		(SORDAT)	ISO 8601:1988	(S) DA	1,1

#### INT 1 Reference:

##### 3.3.1 Coverage

The meta feature **Data Coverage** encodes the area covered by data within the dataset. This feature is also used to provide the ECDIS with the scale information necessary for the determination of dataset loading and unloading in relation to the user selected viewing scale in the ECDIS. There must be a minimum of one **Data Coverage** feature in the dataset. **Data Coverage** features must cover the equivalent area to the extent of the spatial types in the dataset, and must not overlap.

The mandatory attribute **maximum display scale** is used to indicate the largest intended viewing scale for the data. The value populated for **maximum display scale**, therefore, provides a reference for the user selected viewing scale in the ECDIS at which the overscale warning will be displayed if there is no larger maximum display scale ENC dataset available, as well as the ECDIS viewing scale when the cell is loaded. The value also determines the dataset loading strategy as the user defined viewing scale becomes smaller through a series of ENC cells covering a geographic area.

The attribute **minimum display scale** is used, where required, to indicate the smallest intended viewing scale for the data. Where no value is populated for **minimum display scale**, the ECDIS will continue to display the data regardless of how small the user selected viewing scale becomes. The value populated for **minimum display scale**, therefore, is intended to be used in a series of ENC cells covering a geographic area to determine the dataset loading strategy as the user selected viewing scale becomes larger.

If the maximum display scale is different for discrete areas within a single ENC dataset, this must be indicated

by encoding separate, non-overlapping **Data Coverage** features, each having a different value populated for **maximum display scale**. Producing Authorities are to note, however, that overuse of varied maximum compilation scale values within a single dataset must be avoided. Where different values of **maximum display scale** are used, this should be restricted only to data compiled in order to achieve the intended navigational purpose of the entire dataset. If populated, datasets must have the same value for **minimum display scale** for all **Data Coverage** features in the dataset.

The values used for **maximum display scale** and **minimum display scale** must be taken from the following table:

Selectable Range	Standard scale (rounded)
200 NM	1:3000000
96 NM	1:1500000
48 NM	1:700000
24NM	1:350000
12 NM	1:180000
6 NM	1:90000
3 NM	1:45000
1.5 NM	1:22000
0.75 NM	1:12000
0.5 NM	1:8000
0.25 NM	1:4000

Normally, the nearest larger standard scale from the above table, based on the intended optimum display scale for the ENC data as determined by the Producing Authority, **must** be used for **maximum display scale**, e.g. an ENC produced from a 1:25000 paper chart **must normally** have a maximum display scale of 1:22000.

Exceptionally, if source material permits, the next larger scale may be used.

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

Where the source scale is larger than 1:4000 or smaller than 1:3000000 then the actual scale should be used.

**Remarks:**

- This **meta feature** is intended to support an indication of coverage.
- Where more than one **Data Coverage** feature exists for a dataset, the dataset, when loaded, will be displayed in the ECDIS at a display scale corresponding to the largest scale value populated for **maximum display scale**.

**Distinction:**

### 3.4 Nautical publication information

IHO Definition: **NAUTICAL PUBLICATION INFORMATION.** Used to relate additional nautical information or publications to the data. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.213, November 2000).

**S-101 Geo Feature:** Nautical Publication Information (M\_NPUB)

**Primitives:** Point, Surface

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Publication reference	(PUBREF)		TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference:

#### 3.4.1 Reference to other publications

If it is required to encode a reference to other nautical information or publications, it must be done using the meta **feature Nautical Publication Information**.

Remarks:

- References to nautical publications in **Nautical Publication Information**, must be encoded using the attribute **publication reference**, and references to external picture files must be encoded using the attribute **pictorial representation**.
- Nautical Publication Information** should also be used to encode information which may be of use to the mariner, but is not significant to safe navigation and cannot be encoded using existing feature **classes**, using the **complex** attributes **information** and/or **textual description** (see clause **X.X**). **As Nautical Publication Information of type surface do not display in ECDIS, such areas should be encoded to cover the entire area of data coverage for the cell.** This is intended to reduce the number of alarms or indications generated in the ECDIS due to the overuse of **Caution Area features** (see clause **X.X**).

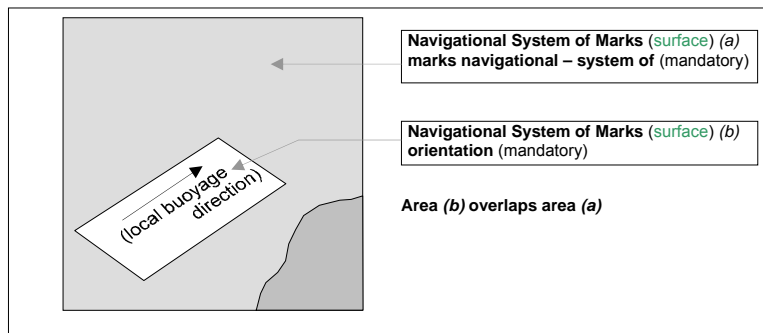
Distinction:



### 3.5 Navigational system of marks

<b>IHO Definition:</b> <b>NAVIGATIONAL SYSTEM OF MARKS.</b> An area within which a specific system of navigational marks applies and/or a common direction of buoyage. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.214, November 2000).				
<b>S-101 Geo Feature:</b> Navigational system of marks (M_NSYS)				
<b>Primitives:</b> Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Marks navigational – system of	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 10 : other system 11 : CEVNI	EN	0,1
Orientation	(ORIENT)		IN	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Scale minimum	(SCAMIN)		IN	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<b>INT 1 Reference:</b> <b>3.5.1 Buoyage systems and direction of buoyage (see S-4 – B-461)</b> The buoyage system of the dataset and, where necessary, the direction of buoyage, must be encoded using the meta <b>feature Navigational System of Marks</b> : All parts of the dataset containing data must be covered by <b>Navigational System of Marks features</b> , with the attribute <b>marks navigational – system of</b> indicating the buoyage system in operation. <b>Navigational System of Marks</b> with a value encoded for MARSYS must not overlap. Within a dataset, there may be some areas where the direction of buoyage is defined by local rules and must, therefore, be specified. These areas should be encoded as separate <b>Navigational System of Marks surface features</b> , with the attribute <b>orientation</b> indicating the direction of buoyage ( <b>marks navigational – system of</b> must not be encoded <b>for these features</b> ). <b>Navigational System of Marks features</b> with a value encoded for <b>orientation</b> must not overlap, but in areas where local buoyage directions apply, <b>Navigational System of</b>				

**Marks** with a value encoded for **orientation** may overlap **Navigational System of Marks** with a value encoded for **marks navigational – system of** (see Figure below).



*Buoyage system and direction*

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

Remarks:

- At least one of the attributes **marks navigational – system of** or **orientation** must be populated for **Navigational System of Marks** features.

### 3.5.1.1 Encoding IALA marks within IALA A or B

In the following table the symbol '/' indicates that this attribute is not relevant for that particular **feature**. The table contains the most common examples of coding; other coding combinations are possible. For encoding of buoys, substitute **Buoy** for **Beacon** in the **Feature** column.

Real World Feature	INT 1	Feature	Defining attribute value *	colour	colour pattern	marks navigational – system of
North cardinal beacon	Q 130.3	Beacon, Cardinal	1	2,6	1	1 and 2 (IALA A and B)
East cardinal beacon	Q 130.3	Beacon, Cardinal	2	2,6,2	1	1 and 2 (IALA A and B)
South cardinal beacon	Q 130.3	Beacon, Cardinal	3	6,2	1	1 and 2 (IALA A and B)
West cardinal beacon	Q 130.3	Beacon, Cardinal	4	6,2,6	1	1 and 2 (IALA A and B)
Isolated danger beacon	Q 130.4	Beacon, Isolated Danger	/	2,3,2	1	1 and 2 (IALA A and B)
Port lateral beacon	Q 130.1	Beacon, Lateral	1	3	/	1 (IALA A)
Starboard lateral beacon	Q 130.1	Beacon, Lateral	2	4	/	1 (IALA A)
Preferred channel to starboard lateral beacon	Q 130.1	Beacon, Lateral	3	3,4,3	1	1 (IALA A)
Preferred channel to port lateral beacon	Q130.1	Beacon, Lateral	4	4,3,4	1	1 (IALA A)
Port lateral beacon	Q130.1	Beacon, Lateral	1	4	/	2 (IALA B)
Starboard lateral beacon	Q130.1	Beacon, Lateral	2	3	/	2 (IALA B)

Preferred channel to starboard lateral beacon	Q130.1	Beacon, Lateral	3	4,3,4	1	2 (IALA B)
Preferred channel to port lateral beacon	Q130.1	Beacon, Lateral	4	3,4,3	1	2 (IALA B)
Safe water beacon	Q130.5	Beacon, Safe Water	/	3, 1 or 1,3	2	1 and 2 (IALA A and B)
Special purpose beacon	Q130.6	Beacon, Special Purpose	/	6	/	1 and 2 (IALA A and B)
Emergency wreck marking buoy		Buoy, Special Purpose	27	5,6	2	1 or 2 (IALA A or B)
North cardinal topmark**	Q 130.3	Beacon, Cardinal	13	2	/	1 and 2 (IALA A and B)
East cardinal topmark**	Q 130.3	Beacon, Cardinal	11	2	/	1 and 2 (IALA A and B)
South cardinal topmark**	Q 130.3	Beacon, Cardinal	14	2	/	1 and 2 (IALA A and B)
West cardinal topmark**	Q 130.3	Beacon, Cardinal	10	2	/	1 and 2 (IALA A and B)
Isolated danger topmark**	Q130.4	Beacon, Isolated Danger	4	2	/	1 and 2 (IALA A and B)
Port lateral topmark**	Q130.1	Beacon, Lateral	5	3	/	1 (IALA A)
Starboard lateral topmark**	Q130.1	Beacon, Lateral	1	4	/	1 (IALA A)
Port lateral topmark**	Q130.1	Beacon, Lateral	5	4	/	2 (IALA B)
Starboard lateral topmark**	Q130.1	Beacon, Lateral	1	3	/	2 (IALA B)
Safe water topmark**	Q130.1	Beacon, Safe Water	3	3	2	1 and 2 (IALA A and B)
Special purpose topmark**	Q130.1	Beacon, Special Purpose	7	6	/	1 and 2 (IALA A and B)
Emergency wreck marking topmark**		Buoy, Special Purpose	8	6	/	1 or 2 (IALA A or B)

\* For cardinal marks, the defining attribute is **category of cardinal mark**. For lateral marks, the defining attribute is **category of lateral mark**. For special purpose marks, the defining attribute is **category of special purpose mark**. For topmarks, the defining attribute is **topmark shape**.

\*\* Entries for topmark – defining attribute value refers to the attribute **topmark**, sub-attribute **topmark shape** for the listed feature. Similarly, the values listed for **colour** and **colour pattern** refer to the sub-attributes of **topmark shape**.

Distinction:

### 3.6 Quality of bathymetric data

<b>IHO Definition: QUALITY OF BATHYMETRIC DATA.</b> An area within which a uniform assessment of the quality of the bathymetric data exists. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.216, November 2000).				
<b>S-101 Geo Feature: Quality of Bathymetric Data (M_QUAL)</b>				
<b>Primitives: Surface</b>				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of zone of confidence in data	(CATZOC)	1 : zone of confidence-A1 2 : zone of confidence-A2 3 : zone of confidence-B 4 : zone of confidence-C 5 : zone of confidence-D 6 : zone of confidence-U (data not assessed)	EN	1,1
Category of temporal variation		1 : unassessed 2 : event 3 : likely to change 4 : unlikely to change	EN	1,1
Depth range maximum value	(DRVAL2)		RE	0,1
Depth range minimum value	(DRVAL1)		RE	0,1
Features detected			C	1,1
Least depth of detected features measured			(S) BO	0,1
Significant features detected			(S) BO	1,1
Size of features detected			(S) RE	0,1
Positional uncertainty	(POSACC)		RE	0,1
Full seafloor coverage			BO	1,1
Sounding uncertainty	(SOUACC)		RE	0,1
Survey date range			C	1,1
Date end	(SUREND)	ISO 8601:1988	(S) DA	0,1
Date start	(SURSTA)	ISO 8601:1988	(S) DA	0,1
Technique of sounding measurement	(TECSOU)	1 : found by echo-sounder 2 : found by side scan sonar 3 : found by multi-beam 4 : found by diver 5 : found by lead-line 6 : swept by wire-drag 7 : found by laser 8 : swept by vertical acoustic system 9 : found by electromagnetic sensor 10 : photogrammetry 11 : satellite imagery 12 : found by levelling 13 : swept by side-scan sonar	EN	0,*

		14 : computer generated		
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			G	0,*
— Authority			(S) TE	1,1
— Nationality			(S) TE	1,1
— ID-code			(S) TE	0,1
— Source			(S) TE	0,1
— Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

#### INT 1 Reference:

##### 3.6.1 Quality, reliability and accuracy of bathymetric data (see S-4 – B-297)

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

- the meta **feature Quality of Bathymetric Data** for an assessment of the quality of bathymetric data;
- the meta **feature Quality of Survey** for additional information about individual surveys (see clause X.X);
- the attributes **quality of sounding measurement**, **sounding uncertainty** and **technique of sounding measurement** on groups of soundings or individual **features**;
- the attributes **positional uncertainty** and **quality of position** on the **spatial types** (see clause X.X).

For the mariner, **Quality of Bathymetric Data** provides the most useful information. Therefore, the use of **Quality of Bathymetric Data** is mandatory for areas containing depth data or bathymetry.

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

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

The meta **feature Quality of Bathymetric Data** defines areas within which uniform assessment exists for the quality of bathymetric data, and must be used to provide an assessment of the overall quality of bathymetric data to the mariner. Areas of a **dataset** containing depth data or bathymetry must be covered by one or more **Quality of Bathymetric Data**, which must not overlap.

#### Remarks:

- To express completeness of bathymetric data, the complex attribute **full seafloor coverage** must be encoded. **Full seafloor coverage** indicates that a systematic method of exploring the sea floor was undertaken to detect significant features. The sub-attributes **size of features detected** and **least depth of detected features measured** must not be encoded unless the sub-attribute **significant features detected** is set to *True*.
- Wherever possible, meaningful and useful values for the attributes **category of temporal variation**, **full seafloor coverage**, and the complex attribute **features detected** must be used for areas of bathymetry. For areas of unstable seafloors, the complex attribute **survey date range (date end)** must be used to indicate the date of the survey of the underlying bathymetric data.
- **Depth range minimum value** must **only** be used on a **Quality of Bathymetric Data feature** where a swept area occupies the entire **Quality of Bathymetric Data surface**.
- **Depth range maximum value** must **only** be used on a **Quality of Bathymetric Data feature** to specify the maximum depth to which **all other attributes** for the **Quality of Bathymetric Data feature** applies. When **depth range maximum value** is specified, **values populated for all other attributes** apply only to depths

equal to or shallower than **depth range maximum value**. No quality information is provided for depths deeper than **depth range maximum value**.

- **Positional uncertainty** is used on a **Quality of Bathymetric Data feature** to specify the positional accuracy of the depths covered by the surface. When **depth range minimum value** is specified, **positional uncertainty** must not be used - there is no positional accuracy information provided for any underlying depths in this circumstance.
- **Sounding uncertainty** is used on a **Quality of Bathymetric Data feature** to specify the vertical accuracy of the depths covered by the surface. When **depth range minimum value** is specified, **sounding uncertainty** refers only to the accuracy of the swept depth defined by **depth range minimum value** - there is no depth accuracy information provided for any underlying depths in this circumstance.
- When the **Quality of Bathymetric Data surface** contains soundings of two or more different techniques, the attribute **technique of sounding measurement** must not be used.
- When the **Quality of Bathymetric Data surface** contains data from only one survey, the date of survey, if required, must be specified using the complex attribute **survey date range**, sub-attribute **date end**. When the **Quality of Bathymetric Data surface** contains data from two or more surveys, the date of the most recent and the oldest survey, if required, must be specified using the complex attribute **survey date range**.
- Additional quality information may be given using the meta feature **Quality of Survey**.
- Where **Quality of Bathymetric Data** areas are encoded over land, all mandatory attributes should be populated with an empty (null) value.
- When **Quality of Bathymetric Data** and the meta feature **Quality of Non-bathymetric Data** are encoded in a **dataset**, they should not overlap.
- When both **Quality of Bathymetric Data** and **Quality of Non-bathymetric Data features** are used in a **dataset**, the area covered by these features should equal the area of data coverage for the **dataset**.
- **Positional uncertainty** on the **Quality of Bathymetric Data** applies to bathymetric data situated within the surface, while **quality of position** or **positional uncertainty** on the associated **spatial types** qualifies the location of the **Quality of Bathymetric Data feature** itself.

### 3.6.1.1 Feature detection

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

The ability to detect bathymetric features must be encoded using the complex attribute **features detected**. The sub-attribute **significant features detected** indicates whether the survey was capable of detecting features of a size indicated by the sub-attribute **size of features detected**. The sub-attribute **least depth of detected features measured** indicates whether the least depth of detected features was found. For instance, if a wreck was found, but it is not certain that the least depth of that wreck was measured, **least depth of detected features measured** must be set to *No*.

### 3.6.1.2 Temporal variation

The changeability of the bathymetry must be encoded using **category of temporal variation**. In order for a time reference to be given for the expression of temporal variation, the relevant dates of the bathymetric data must be encoded using the complex attribute **survey date range**.

### 3.6.1.3 Sounding accuracy

Sounding accuracy is encoded using the attribute **sounding uncertainty** on **Quality of Bathymetric Data**. If it is required to encode additional sounding accuracy information, it must be done using the attribute **sounding uncertainty** on individual geo features (e.g. **Sounding**).

The accuracy of sounding must not be encoded using **sounding uncertainty** on the depth geo feature, unless it is different to the value of **sounding uncertainty** encoded on **Quality of Bathymetric Data**.

### 3.6.1.4 Technique of sounding measurement

If it is required to encode the technique of sounding measurement, it must be done using the attribute **technique of sounding measurement** on either **Quality of Bathymetric Data** or on individual geo features (e.g. **Sounding**).

The technique of sounding measurement must not be encoded using **technique of sounding measurement** on the depth geo feature, unless it is different to the value of **technique of sounding measurement** encoded on **Quality of Bathymetric Data**.

Distinction: Accuracy of data; quality of survey.

### 3.7 Sounding datum

<b>IHO Definition:</b> <b>SOUNDING DATUM.</b> An area of uniform sounding datum. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.217, November 2000).				
<b>S-101 Geo Feature:</b> Sounding datum (M_SDAT)				
<b>Primitives:</b> Surface				
<i>Real World</i>		<i>Paper Chart Symbol</i>		<i>ECDIS Symbol</i>
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Status	(STATUS)	1 : permanent 2 : occasional 5 : periodic/intermittent 7 : temporary 9 : mandatory 12 : illuminated 16 : watched 17 : un-watched	EN	0,*
Vertical datum	(VERDAT)	1 : Mean low water spring 2 : Mean lower low water springs 3 : Mean sea level 4 : Lowest low water 5 : Mean low water 6 : Lowest low water springs 7 : Approximate mean low water springs 8 : Indian spring low water 9 : Low water springs 10 : Approximate lowest astronomical tide 11 : Nearly lowest low water 12 : Mean lower low water 13 : Low water 14 : Approximate mean low water 15 : Approximate mean lower low water 16 : Mean high water 17 : Mean high water springs 18 : High water 19 : Approximate mean sea level 20 : High water springs 21 : Mean higher high water 22 : Equinoctial spring low water 23 : Lowest astronomical tide 24 : Local datum 25 : International great lakes datum 1985 26 : Mean water level 27 : Lower low water large tide 28 : Higher high water large tide 29 : Nearly highest high	EN	1,1

		water 30 : Highest astronomical tide (HAT)		
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><b>INT 1 Reference:</b></p> <p><b>3.7.1 Sounding datum</b></p> <p>Sounding datum information is encoded in the <b>dataset metadata</b> or by the meta <b>feature Sounding Datum</b>, and must be constant over large areas. The values encoded in the attributes <b>value of sounding</b>, <b>depth range minimum value</b>, <b>depth range maximum value</b> and <b>value of depth contour</b>, and the sounding values encoded in <b>Sounding features (positive values down)</b>, are referenced to this datum.</p> <p>The default value for the entire dataset must be given in the "Vertical Datum" [VDAT] subfield of the "Coordinate Reference System Header" [CRSH] field.</p> <p>If the sounding datum for an area is different to the value given in the [VDAT] subfield for the dataset, it must be encoded using <b>Sounding Datum</b>. The areas covered by these meta <b>features</b> must not overlap. If it is required to encode a sounding datum for individual features that is different from the dataset header, or a <b>Sounding Datum</b> feature covering the features, it must be encoded using the attribute <b>vertical datum</b> on the individual features.</p> <p>Depth contours and depth areas going across areas having different values of sounding datum must be split at the border of those areas. Other features that should be split include <b>Marine Farm/Culture</b>, <b>Obstruction and Wreck</b>, but only where the value of <b>value of sounding</b> is known; and <b>Berth</b>, <b>Cable Submarine</b>, <b>Deep Water Route Centreline</b>, <b>Deep Water Route Part</b>, <b>Dredged Area</b>, <b>Dry Dock</b>, <b>Fairway</b>, <b>Floating Dock</b>, <b>Gate</b>, <b>Pipeline Submarine/On Land</b>, <b>Recommended Route Centreline</b>, <b>Recommended Track</b>, <b>Swept Area</b>, <b>Two-Way Route Part</b> and <b>Quality of Bathymetric Data</b>, but only if the value of <b>depth range minimum value</b> and/or <b>depth range maximum value</b> is known.</p> <p><b>Remarks:</b></p> <ul style="list-style-type: none"> <li>No remarks.</li> </ul> <p><b>Distinction:</b> Vertical datum.</p>				

**Comment [j16]:** These clauses need to be sorted out in regard to how vertical and sounding datums are going to work in S-101.



### 3.8 Quality of survey

IHO Definition: <b>QUALITY OF SURVEY</b> . An area within which a uniform assessment of the reliability of source survey information exists. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.218, November 2000).				
<b>S-101 Geo Feature: Quality of survey (M_SREL)</b>				
<b>Primitives:</b> Curve, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Features detected			C	1,1
Least depth of detected features measured			(S) BO	0,1
Significant features detected			(S) BO	1,1
Size of features detected			(S) RE	0,1
Full seafloor coverage			BO	1,1
Line spacing maximum			IN	0,1
Line spacing minimum			IN	0,1
Measurement distance maximum			RE	0,1
Measurement distance minimum			RE	0,1
Quality of position	(QUAPOS)	1 : surveyed 2 : unsurveyed 3 : inadequately surveyed 4 : approximate 5 : position doubtful 6 : unreliable 7 : reported (not surveyed) 8 : reported (not confirmed) 9 : estimated 10 : precisely known 11 : calculated	EN	0,1
Quality of sounding	(QUASOU)	1 : depth known 2 : depth or least depth unknown 3 : doubtful sounding 4 : unreliable sounding 5 : no bottom found at value shown 6 : least depth known 7 : least depth unknown, safe clearance at value shown 8 : value reported (not surveyed) 9 : value reported (not confirmed) 10 : maintained depth 11 : not regularly maintained	EN	0,*
Scale value maximum	(SCVAL1)	scale value maximum < scale value minimum	IN	0,1
Scale value minimum	(SCVAL2)	scale value minimum > scale value maximum	IN	0,1

Sounding distance maximum	(SDISMX)		IN	0,1
Sounding distance minimum	(SDISMN)		IN	0,1
Survey authority	(SURATH)		TE	1,1
Survey date range			C	1,1
Date end	(SUREND)	ISO 8601:1988	(S) DA	0,1
Date start	(SURSTA)	ISO 8601:1988	(S) DA	0,1
Survey type	(SURTYP)	1 : reconnaissance / sketch survey 2 : controlled survey 4 : examination survey 5 : passage survey 6 : remotely sensed	EN	1,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

#### INT 1 Reference:

#### 3.8.1 Survey reliability and source of bathymetric data

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

#### Remarks:

- To express completeness of bathymetric data, the complex attribute **full seafloor coverage** must be encoded. **Full seafloor coverage** indicates that a systematic method of exploring the sea floor was undertaken to detect significant features. The sub-attributes **size of features detected** and **least depth of detected features measured** must not be encoded unless the sub-attribute **significant features detected** is set to *True*.
- If the attributes **sounding uncertainty** and **technique of sounding measurement** are required, they must be encoded on either the meta feature **Quality of Bathymetric Data** or on individual geo features (e.g. **Sounding**).
- If it is required to encode details of the survey authority, it must be done using the attribute **survey authority**, and must not be encoded using the attribute **source indication**.
- If a feature has a source different to that given by the underlying **Quality of Survey**, this other source should be encoded using both the attributes **source indication** and **source date** on the feature, but only if this information is considered to be useful to the mariner.
- **Quality of position** on the **Quality of Survey** applies to bathymetric data situated within the area, while **quality of position** or **positional uncertainty** on the associated **spatial types** qualifies the location of the **Quality of Survey feature** itself.

#### 3.8.2 Quality of sounding

If it is required to encode the quality of sounding, it must be done using the attribute **quality of sounding**

**measurement** on either the **Quality of Survey** or on individual geo **features** (e.g. **Sounding**).

The quality of sounding must not be encoded using **quality of sounding measurement** on the depth geo **feature**, unless it is different to the value of **quality of sounding measurement** encoded on **Quality of Survey** (see tables **X.X** and **X.X**).

Remarks:

- No remarks.

Distinction: Accuracy of data; quality of data

### 3.9 Vertical datum

**IHO Definition:** **VERTICAL DATUM.** An area of uniform vertical datum. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.218, November 2000).

**S-101 Geo Feature:** Vertical datum of data (M\_VDAT)

**Primitives:** Surface

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Vertical datum	(VERDAT)	1-: Mean-low-water-spring 2-: Mean-lower-low-water springs 3 : Mean sea level 4-: Lowest-low-water 5-: Mean-low-water 6-: Lowest-low-water springs 7-: Approximate-mean-low water-springs 8-: Indian-spring-low-water 9-: Low-water-springs 10-: Approximate-lowest astronomical-tide 11-: Nearly-lowest-low-water 12-: Mean-lower-low-water 13-: Low-water 14-: Approximate-mean-low water 15-: Approximate-mean lower-low-water 16 : Mean high water 17 : Mean high water springs 18 : High water 19 : Approximate mean sea level 20 : High water springs 21 : Mean higher high water 22-: Equinoctial-spring-low water 23-: Lowest-astronomical tide 24 : Local datum 25 : International great lakes datum 1985 26 : Mean water level 27-: Lower-low-water-large tide 28 : Higher high water large tide 29 : Nearly highest high water 30 : Highest astronomical tide (HAT)	EN	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1

Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

#### INT 1 Reference:

##### 3.9.1 Vertical datum

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

The default value for the entire dataset must be given in the "Vertical Datum" [VDAT] subfield of the "Coordinate Reference System Header field" [CRSH] field.

If the vertical datum for an area is different to the value given in the **VDAT** subfield for the dataset, it must be encoded using **Vertical Datum of Data**. The areas covered by these meta **features** must not overlap.

Height contours, going across areas having different values of vertical datum, must be split at the border of these areas.

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

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

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

#### Remarks:

- No remarks.

Distinction: Sounding datum.

### 3.10 Update information

IHO Definition: UPDATE INFORMATION. The Update information Feature is used to represent a change to the information shown.

S-101 Geo Feature: Update information

Primitives: Point, Curve, Surface

Real World	Paper Chart Symbol	ECDIS Symbol		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Update description			TE	1,1
Update reference			TE	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale maximum	(SCAMAX)	scale maximum < scale minimum	IN	0,1
Scale minimum	(SCAMIN)	scale minimum > scale maximum	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source date	(SORDAT)		DA	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
Association	Acronym	Role	Multiplicity	
Updated information		Updates	0,*	

INT 1 Reference:

3.10.1 Update information

If it is required to encode information about changes made to ENC data it must be done using Update Information. This feature must be encoded to cover the extent of changed data incorporated in the SENC via ENC Updates (ER Application Profile), and may also be used to indicate changes introduced in ENC New Editions. It carries information about the changes. This feature may be associated with features which have changed using the feature association Updated Information.

Remarks:

- The attribute **update reference** may be used to indicate the related paper chart notice to mariner's number.
- At each new edition of an ENC cell **Update Information** features which are no longer relevant should be deleted.
- Where information has been deleted from an ENC the **Update Information** feature should cover the extent of the deleted information.

Distinction: Information area; caution area.

## 4 Magnetic Data

### 4.1 Local Magnetic Anomaly

**IHO Definition:** **LOCAL MAGNETIC ANOMALY.** An anomaly of the magnetic field of the Earth, extending over a relatively small area, due to local magnetic influences. Also called local **attraction or magnetic anomaly**. (IHO Dictionary – S-32).

**S-101 Geo Feature:** Local magnetic anomaly (LOCMAG)

**Primitives:** Point, Curve, Surface

<i>Real World</i>		<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>	
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Value of local magnetic anomaly	(VALLMA)		C	1,1
Anomaly value maximum		anomaly value maximum < anomaly value minimum (+/- decimal degrees)	(S) RE	1,1
Anomaly value minimum		anomaly value minimum > anomaly value maximum (+/- decimal degrees)	(S) RE	0,1
Information			C	0,1
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,1
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale maximum	(SCAMAX)	scale maximum < scale minimum	IN	0,1
Scale minimum	(SCAMIN)	scale minimum > scale maximum	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1



Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><u>INT 1 Reference:</u> B 82.1-2</p> <p><b>4.1.1 Abnormal magnetic variation (see S-4 – B-274)</b></p> <p>Of the various magnetic data, magnetic variation is the most important element for the mariner. If it is required to encode an abnormal magnetic variation in a localised area, it must be done using the feature <b>Local Magnetic Variation</b>.</p> <p>If the area cannot be defined, the feature should be represented as a point.</p> <p><del>When the deviation for an area makes reference to a range rather than a specific value, the range of values should be indicated using the attribute <b>information</b> (e.g. <i>From -27 degrees to 3 degrees</i>).</del></p> <p><u>Remarks:</u></p> <ul style="list-style-type: none"> <li>Where the mandatory complex attribute <b>value of local magnetic anomaly</b> contains a value in the sub-attribute <b>anomaly value maximum</b> only, the deviation is assumed to be positive and negative by that amount. Where the positive and negative values for the local magnetic anomaly differ, the positive value must be populated in <b>anomaly value maximum</b>, and the negative value in the sub-attribute <b>anomaly value minimum</b>. The plus/minus character must not be encoded.</li> <li>Local magnetic variation should not be encoded unless it varies by more than about 3° from the normal magnetic variation (see clause X.X) for the area.</li> </ul> <p><u>Distinction:</u> Magnetic variation.</p>				

## 4.2 Magnetic Variation

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

**S-101 Geo Feature:** Magnetic variation (MAGVAR)

**Primitives:** Point, Curve, Surface

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,0
Reference year for magnetic variation	(RYRMGV)	ISO 8601:1988 (YYYY)	DA	1,1
Value of annual change in magnetic variation	(VALACM)	+/- decimal minutes	RE	1,1
Value of magnetic variation	(VALMAG)	+/- decimal degrees	RE	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Scale maximum	(SCAMAX)	scale maximum < scale minimum	IN	0,1
Scale minimum	(SCAMIN)	scale minimum > scale maximum	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

**INT 1 Reference:** B 68, 70-71

### 4.2.1 Magnetic variation (see S-4 – B-261; B-270 to B-273)

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

**Remarks:**

- The mandatory attribute **reference year for magnetic variation** must be used to populate the year value only (see clause X.X for format of date type attributes).
- Magnetic models are typically replaced every five years (e.g. 2005, 2010... termed epochs). Magnetic

variation can be calculated from computer models, or derived from charts produced by certain Hydrographic Offices or mapping authorities, which show the spatial distribution of magnetic variation values worldwide for the current epoch, by means of lines of equal magnetic variation (termed isogonals). The rate-of-change curves, which are over-printed on such charts, enable values for any point to be extrapolated for any time within the current epoch.

- **Magnetic Variation** features of type **curve** (isogonals) should be encoded at 1°, 2°, or 5° intervals so that spacing does not generally exceed 150mm at the maximum display scale of the ENC data. Isogonals should not be inserted at intervals of less than 1°, because diurnal and seasonal fluctuations in the earth's magnetic field can change the stated variation by up to 1° and, in some parts of the world, the data on which isogonals are based may not ensure the accuracy of charted values to better than  $\pm 2^\circ$ . Where isogonals cannot be encoded such that the spacing does not exceed 150mm at the maximum display scale of the ENC data, **Magnetic Variation** of type **point** should be encoded.
- When populating the attribute **value of annual change in magnetic variation**, a positive value, i.e. unsigned, indicates a change in an easterly direction and a negative value indicates a change in a westerly direction.
- When populating the attribute **value of magnetic variation**, a positive value, i.e. unsigned, indicates variation in a easterly direction and a negative value indicates variation in a westerly direction.

Distinction: Local magnetic anomaly.

## 5 Natural Features

### 5.1 Coastline

<b>IHO Definition:</b> <b>COASTLINE.</b> A line where shore and water meet. Although the terminology of coasts and shores is rather confused, shoreline and coastline are generally used as synonyms. (IHO Dictionary – S-32).				
<b>S-101 Geo Feature: Coastline (COALNE)</b>				
<b>Primitives:</b> <b>Curve</b>				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of coastline	(CATCHP)	1 : steep coast 2 : flat coast 3 : sandy shore 4 : stony shore 5 : shingly shore 6 : glacier (seaward end) 7 : mangrove 8 : marshy shore 9 : coral reef 10 : ice coast 11 : shelly shore	EN	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Radar conspicuous	(CONRAD)		BO	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1

Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: C 1-8, 25, 32-33

#### 5.1.1 Coastline (see S-4 – B-410 and B-411)

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

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

#### 5.1.2 Natural coastline (see S-4 – B-312 and B-353.8)

**spatial types** associated with coastlines **considered to be inadequately surveyed at the maximum display scale for the ENC data** (see S-4 – B-311) should be encoded using spatial attribute **quality of position** = 3 (inadequately surveyed).

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

A steep coast may give a good radar return and is useful for visual identification from a considerable distance off, particularly where cliffs alternate with low lying coast along the shoreline. If it is required to encode a section of the coastline giving a good radar return it must be done using attribute **radar conspicuous**. If it is required to encode a section of the coastline which is visually conspicuous it must be done using attribute **visually conspicuous**.

#### Remarks:

- **Coastline** must only exist at the boundary of **Land Area** of type **surface**.
- **Coastline** and **Shoreline Construction** of type curve must not overlap. Similarly, **Coastline** should not share an edge with a **Shoreline Construction** of type surface (see clause X.X) having attribute **water level effect** undefined or populated with the values 2 (always dry) or 1 (partly submerged at high water), which is covered by **Land Area**.
- If the seaward edge of a mangrove area is coincident with the coastline, the coastline should be encoded as **Coastline**, with **category of coastline** = 7 (mangrove). If it is required to encode the area of the mangrove, this must be done using the feature **Vegetation** (see clause X.X). Where the source indicates that the mangrove area is within an intertidal area, the seaward limit of the mangrove area must not be encoded as **Coastline**, and the mangrove area must be encoded as **Vegetation**. See also S-4 - B-312.4. In all cases the **spatial type** for the seaward edge of the mangrove should have attribute **quality of position** = 4 (approximate).
- If the seaward edge of a marsh area is coincident with the coastline, the coastline should be encoded as **Coastline**, with **category of coastline** = 8 (marshy shore), and the coastline's **spatial type** should have the attribute **quality of position** = 4 (approximate). If it is required to encode the area of the marsh, this must be done using **Vegetation** (see clause X.X).
- If the seaward edge of an encoded saltpan area is coincident with the coastline, it should be encoded using **Coastline**, with **category of coastline** = 2 (flat coast).
- If the seaward edge of an encoded glacier is coincident with the coastline, this edge should be encoded using **Coastline**, with **category of coastline** = 6 (glacier (seaward end)).
- Where the source indicates a cliff is coincident with the coastline (see INT1 - C3), a **Coastline** feature, with

Comment [J17]: S-58 Test 51.

**category of coastline = 1** (steep coast) should be encoded. In such cases, there should be no **Slope Topline** or **Sloping Ground** features encoded, in order to avoid clutter. If it is required to encode a section of the coastline which provides a good radar return, it must be done using attribute **radar conspicuous** on the **coastline** feature. If it is required to encode a section of the coastline that is visually conspicuous, it must be done using attribute **visually conspicuous** on the **coastline** feature.

Distinction: Canal bank; lake shore; river bank; shoreline construction; slope topline; sloping ground.

## 5.2 Land elevation

IHO Definition: <b>LAND ELEVATION</b> . An elevation is the vertical distance of a point or a level, on, or affixed to, the surface of the earth, measured from a specified vertical datum. (Adapted from IHO Dictionary – S-32).				
<b>S-101 Geo Feature: Land elevation (LNDELV)</b>				
<b>Primitives:</b> Point, Curve				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Elevation	(ELEVAT)		RE	1,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference			(S) TE	1,1
Language	(TXTDSC)	ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
INT 1 Reference: C 10-13				
<b>5.2.1 Height contours, spot heights (see S-4 – B-351 and B-352.1-2)</b>				
It is assumed that mariners will understand most methods of representation of relief with little difficulty. In general it is assumed that Producing Authorities will choose the representation of relief most suitable to the terrain being charted and the navigational requirements. It is therefore left to national discretion to:				
<ul style="list-style-type: none"> <li>omit all relief representation, except dykes and sea walls;</li> <li>omit all relief representation, except spot heights and cliffs;</li> <li>show relief by contours (and spot heights); or</li> <li>show relief by form lines (and spot heights).</li> </ul>				

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

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

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

Height contours are associated with **curve spatial types** whereas spot heights are associated with point **spatial types**.

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

**Remarks:**

- Where it would not be worthwhile to contour ENC data of smaller maximum display scale, form lines (emphasizing a few 'remarkable' hills) and/or spot heights may be used to emphasize individual features.
- Contours should reflect the nature of the topography, i.e. they should not be rounded or smoothed (by generalisation) when they should really be angular.
- The contour interval must be uniform for any dataset, or series of datasets of the same or similar maximum display scale, except that the lowest contour may be a supplementary one, e.g. 25 metres where the basic interval is every 50 metres, or 10 metres where the basic interval is every 25 metres. Ideally the contour interval should be chosen so that not more than 10 contours are needed for the full range of height on a single dataset or particular series of datasets (for clarity and economy).

**Distinction:** Slope top line.



### 5.3 River

<b>IHO Definition:</b> RIVER. A relatively large natural stream of water. (IHO Dictionary – S-32)				
<b>S-101 Geo Feature:</b> River (RIVERS)				
<b>Primitives:</b> Curve, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
<b>S-101 Attribute</b>	<b>S-57 Acronym</b>	<b>Allowable Encoding Value</b>	<b>Type</b>	<b>Multiplicity</b>
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Status	(STATUS)	<del>2 : occasional</del> 5 : periodic/intermittent 8 : private 14 : public	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<b>INT 1 Reference:</b> C 20, 21 <b>5.3.1 Rivers (see S-4 – B-353)</b> Inland navigable waters must be compiled as fully as practicable, consistent with the maximum display scale of the ENC data. Other rivers should be compiled only in a limited way to assist in providing a general indication of the topography (except close to the coastline where they may be of direct significance to the mariner). If it is required to encode a non-navigable river, stream or creek, it must be done using the feature River. <b>Remarks:</b>				

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

Distinction: Canal; lake; river bank; sea area/named water area; tideway.

## 5.4 Rapids

<b>IHO Definition:</b> <b>RAPID(S)</b> . Portions of a stream with accelerated current where it descends rapidly but without a break in the slope of the bed sufficient to form a waterfall. Usually used in the plural. (IHO Dictionary – S-32).				
<b>S-101 Geo Feature:</b> Rapids (RAPIDS)				
<b>Primitives:</b> Point, Curve, Surface				
Real World	Paper Chart Symbol	ECDIS Symbol		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Vertical length	(VERLEN)		RE	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<b>INT 1 Reference:</b> C 22				
<b>5.4.1 Rapids (see S-4 – B-353.5)</b>				
If it is required to encode rapids within a river, it must be done using the <b>feature Rapids</b> .				
<b>Remarks:</b>				
<ul style="list-style-type: none"> <li>The area covered by rapids must also be covered by a <b>River feature</b> (see clause X.X), and a <b>Land Area or Unsurveyed Area feature</b>.</li> </ul>				
<b>Distinction:</b> Current – non-gravitational; tidal stream – harmonic prediction; tidal stream – non-harmonic prediction; tidal stream panel data; tidal stream – time series; water turbulence; waterfall.				

## 5.5 Waterfall

<b>IHO Definition:</b> <b>WATERFALL.</b> A vertically descending part of a watercourse where it falls from a height (for example: over a rock or a precipice). In place names, commonly shortened to “fall” or “falls”, e.g. “Niagara Falls”. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).				
<b>S-101 Geo Feature:</b> Waterfall (WATFAL)				
<b>Primitives:</b> Point, Curve				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<b>INT 1 Reference:</b> C 22 <b>5.5.1 Waterfalls (see S-4 – B-353.5)</b> If it is required to encode a waterfall within a river, it must be done using the <b>feature Waterfall</b> . <b>Remarks:</b> <ul style="list-style-type: none"> <li>The area covered by a waterfall must also be covered by a <b>River feature</b>, and a <b>Land Area</b> or <b>Unsurveyed Area feature</b>.</li> </ul> <b>Distinction:</b> Rapids.				

## 5.6 Lake

IHO Definition: <b>LAKE</b> . A large body of water entirely surrounded by land. (IHO Dictionary – S-32).				
<b>S-101 Geo Feature:</b> Lake (LAKARE)				
<b>Primitives:</b> Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
<b>S-101 Attribute</b>	<b>S-57 Acronym</b>	<b>Allowable Encoding Value</b>	<b>Type</b>	<b>Multiplicity</b>
Elevation	(ELEVAT)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><b>INT 1 Reference:</b> C 23</p> <p><b>5.6.1 Lakes (see S-4 – B-353.6)</b></p> <p>Inland navigable waters must be compiled as fully as practicable, consistent with the maximum display scale of the ENC data. Other lakes should be compiled only in a limited way to assist in providing a general indication of the topography (except close to the coastline where they may be of direct significance to the mariner).</p> <p>If it is required to encode a non-navigable lake, it must be done using the feature Lake.</p> <p><b>Remarks:</b></p> <ul style="list-style-type: none"> <li>If the lake is navigable at the maximum display scale for the ENC data, it must be encoded using the feature <b>Depth Area</b> or <b>Dredged Area</b> (see clause X.X), and the lake shore must be encoded using the feature <b>Coastline</b> or <b>Shoreline Construction</b>. The lake must not be encoded as a Lake feature in this case. If it</li> </ul>				

is required to encode the name of the lake, it must be done using a **Sea Area/Named Water Area feature**, with attribute **category of sea area** = 52 (lake).

- If it is required to encode a lake that is not navigable at the maximum display scale for the ENC data, it must be done using **Lake**, covered by a **Land Area** or **Unsurveyed Area feature**. The name of the lake should be encoded using the complex attribute **feature name** on the **Lake feature**.
- If it is required to encode an island in a non-navigable lake encoded on **Land Area**, this must be done by encoding a "hole" in the **Lake** feature if the island is a surface at the maximum display scale for the ENC data, or encoding **Land Area** of type point if the island is a point at the maximum display scale for the ENC data. Encoders must not encode **Land Area** surfaces on top of **Land Area** surfaces. If it is required to encode an island in a non-navigable lake encoded on **Unsurveyed Area**, this must be done by encoding a "hole" in both the **Lake** and **Unsurveyed Area** features and replacing with **Land Area** if the island is a surface at the maximum display scale for the ENC data, or encoding **Land Area** of type point if the island is a point at the maximum display scale for the ENC data. Encoders must not encode **Land Area** surfaces on top of **Unsurveyed Area** surfaces.

Distinction: Canal; depth area; river.

## 5.7 Land region

<b>IHO Definition:</b> <b>LAND REGION.</b> An area of natural scenery defined by its geographical characteristics and may be known by its proper name. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.92, November 2000).				
<b>S-101 Geo Feature:</b> Land region (LNDRGN)				
<b>Primitives:</b> Point, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of land region	(CATLND)	1 : fen 2 : marsh 3 : moor/bog 4 : heathland 5 : mountain range 6 : lowlands 7 : canyon lands 8 : paddy field 9 : agricultural land 10 : savanna/grassland 11 : parkland 12 : swamp 13 : landslide 14 : lava flow 15 : salt pan 16 : moraine 17 : crater 18 : cave 19 : rock column or pinnacle 20 : cay	EN	0,*
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Nature of surface	(NATSUR)	1 : mud 2 : clay 3 : silt 4 : sand 5 : stone 6 : gravel 7 : pebbles 8 : cobbles 9 : rock 11 : lava 14 : coral 17 : shells 18 : boulder	(S) EN	0,*
Water level effect	(WATLEV)	1 : partly submerged at high water 2 : always dry 4 : covers and uncovers 6 : subject to inundation or	EN	0,1

		flooding		
Information			C	0,*
Language		ISO 639-3	(S) TW	0,1
Text	(INFORM)		(S) TW	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TW	1,1
Language		ISO 639-3	(S) TW	0,1
Scale maximum	(SCAMAX)	scale maximum < scale minimum	IN	0,1
Scale minimum	(SCAMIN)	scale minimum > scale maximum	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: C 24, 26, 33

#### 5.7.1 Natural sceneries (see S-4 – B-350)

The types of features charted and the distance inland to which they are shown will vary with the maximum display scale of the ENC data, type of terrain, availability of source data and, possibly, adequacy of regular navigational aids. The significance to the mariner must be judged by the requirements of both visual and radar navigation.

The navigator sees the coast in profile; the cartographer compiles it in plan and must always be aware that the navigator's interest in land detail is at its greatest at the coastline and falls off rapidly inland. On a low-lying coast, even minor clues to position near the coast, e.g. sand dunes, hillocks, low bluffs, may be very useful on most detailed ENC datasets. On steep coasts with deep water close inshore, sea traffic is likely to be concentrated off projecting points of land, and the nature of each headland must be made clear, whether it has vertical cliffs, or a sloping or low profile, for example.

Off coasts inadequately marked by navigational aids, detailed topography in the coastal belt will allow the mariner to clear dangers with the aid of improvised visual transits of charted topographical features.

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

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

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

#### Remarks:

- This feature has a use similar to that of the feature **Sea Area/Named Water Area** (see clause X.X), but for the land.
- At least one of the attributes **category of land region** or **feature name** must be populated.
- A **Land Region** surface should be bounded, if possible, by existing curves used by other features (e.g. **Coastline**). If necessary, however, this surface may be bounded by other curves created to close the surface, or to describe a new surface.
- For named capes, points, peninsulas and other types of **Land Region** where there is no specific value for the attribute **category of land region**, the generic term "Cape", "Point", "Peninsula", etc may be included on



the attributes **feature name** and **feature name in national language**, unless the name has been populated on an underlying **Land Area**, in which case **Land Region** should not be encoded.

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

#### 5.7.1.1 Marsh (see S-4 – B-312.2)

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

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

#### 5.7.1.2 Salt pans (see S-4 – B-353.7)

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

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

#### 5.7.1.3 Lava flow (see S-4 – B-355)

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

Distinction: Sea area; land area; vegetation.

## 5.8 Vegetation

<b>IHO Definition:</b> <b>VEGETATION.</b> Plants collectively or individually, especially those dominating a particular area or habitat. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).				
<b>S-101 Geo Feature:</b> Vegetation (VEGATN)				
<b>Primitives:</b> Point, Curve, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of vegetation	(CATVEG)	1 : grass 3 : bush 4 : deciduous wood 5 : coniferous wood 6 : wood in general (inc. mixed wood) 7 : mangroves 10 : mixed crops 11 : reed 12 : moss 13 : tree in general 14 : evergreen tree 15 : conifer tree 16 : palm tree 17 : nipa palm tree 18 : casuarinas tree 19 : eucalypt tree 20 : deciduous tree 21 : mangrove tree 22 : filao tree	EN	1,1
Elevation	(ELEVAT)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1

Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

**INT 1 Reference:** C 14, 30, 31.1-8, 32, 33

**5.8.1 Vegetation (see S-4 – B-312.4; B-352.4 and B-354)**

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

- Areas where trees or marsh form the apparent coastline; see S-4 – B-312;
- Isolated trees or clumps of trees forming landmarks;
- Where, near the coast, wooded areas alternate with areas without tree cover and so may assist in identifying headlands or other stretches of coastline.

The following features should be omitted from even the largest maximum display scale ENC data:

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

If it is required to encode an isolated tree used as a landmark, it must be done using a **Vegetation feature**, with attribute **category of vegetation** = 13 to 21.

If it is required to encode a mangrove area, it must be done using a **Vegetation feature**, with **category of vegetation** = 7 (mangroves).

If the source indicates the seaward edge of a mangrove area lies in or bounds the seaward edge of an intertidal area, the seaward edge of the encoded mangrove area should be encoded using a **Coastline** feature, with attribute **category of coastline** = 7 (mangrove), and the mangrove area's corresponding **spatial type** should have the attribute **quality of position** = 4 (approximate). The landward edge of the mangrove area (which also bounds **Land Area**) should be encoded using a **Coastline** feature having no value for **category of coastline** and no value for **quality of position** for the related edge(s). Where the source indicates the seaward edge of the mangrove area is coincident with the high water line (boundary of **Land Area**), the seaward edge of the encoded mangrove area should be encoded using a **Coastline** feature, with attribute **category of coastline** = 7 (mangrove), and the mangrove area's corresponding **spatial type** should have the attribute **quality of position** = 4 (approximate).

**Remarks:**

- The attribute **height** is used to encode the approximate altitude of the highest point of the top of the vegetation. Where the source shows an island with the approximate height of the top of the vegetation above height datum (see INT1 - C14), a **Vegetation** feature should be encoded co-incident with the **Land Area** feature of the island, with attribute **height** corresponding to the value shown on the source.

**Distinction:** Seabed area; weed/kelp.

## 5.9 Ice area

IHO Definition: <b>ICE AREA.</b> An area of ice over land or water. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.84, November 2000).				
<b>S-101 Geo Feature:</b> ice area (ICEARE)				
<b>Primitives:</b> Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of ice	(CATCHP)	1 : fast ice 5 : glacier 8 : polar ice	EN	1,1
Date range			C	0,1
Date end	(PEREND)	ISO 8601:1988	(S) DA	0,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	1,1
Elevation	(ELEVAT)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
Status	(STATUS)	1 : permanent 2 : occasional 5 : periodic/intermittent 16 : watched 17 : un-watched 18 : existence doubtful	EN	0,*
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*

Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><u>INT 1 Reference:</u> C 25; N 60.1-2</p> <p><b>5.9.1 Ice areas (see S-4 – B-353.8 and B-449.1)</b></p> <p>If it is required to encode an ice area, it must be done using the <b>feature Ice Area</b>.</p> <p><u>Remarks:</u></p> <ul style="list-style-type: none"> <li>• <b>Ice Area features</b> that are located in the sea must be covered by a <b>Land Area</b> or <b>Unsurveyed Area feature</b>, if the depth of water beneath them is unknown, or covered by a <b>Depth Area feature</b>, if the depth is known.</li> <li>• <b>As ice fronts move, a date when the limit was surveyed should be included, if possible, using the attribute source date.</b></li> </ul> <p><b>5.9.1.1 Glaciers (see S-4 – B-353.8)</b></p> <p>If it is required to encode the portion of a glacier that is on land, it must be done using an <b>Ice Area feature</b>, with attribute <b>category of ice</b> = 5 (glacier) covered by a <b>Land Area feature</b> (i.e. the glacier does not form a hole in the land area).</p> <p>If the seaward edge of an encoded glacier is coincident with the coastline, this edge should be encoded using a <b>Coastline feature</b>, with attribute <b>category of coastline</b> = 6 (glacier (seaward end)).</p> <p><u>Distinction:</u> Depth area; land area.</p>				

## 5.10 Sloping ground

<b>IHO Definition:</b> <b>SLOPING GROUND.</b> An inclined surface. (Adapted from <b>IHO Dictionary – S-32</b> ).				
<b>S-101 Geo Feature:</b> Sloping ground ( <b>SLOGRD</b> )				
<b>Primitives:</b> Point, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
<b>S-101 Attribute</b>	<b>S-57 Acronym</b>	<b>Allowable Encoding Value</b>	<b>Type</b>	<b>Multiplicity</b>
Category of slope	(CATSLO)	1 : cutting 2 : embankment 3 : dune 4 : hill 6 : cliff 7 : scree	EN	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Nature of surface	(NATSUR)	1 : mud 2 : clay 3 : silt 4 : sand 5 : stone 6 : gravel 7 : pebbles 8 : cobbles 9 : rock 11 : lava 14 : coral 17 : shells 18 : boulder	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*

Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: C 3, 4, 8; D 14, 15; F 1

#### 5.10.1 Sloping ground (see S-4 – B-312.1; B-312.3; B-363.2 and B-364.1)

##### Remarks:

- **Sloping Ground** of type surface that are not radar conspicuous (i.e. **radar conspicuous** not populated)) and having attribute **category of slope** = 1 (cutting), 2 (embankment), 3 (dune), 4 (hill) or 7 (scree) do not symbolise in the ECDIS. Where it is required to encode such areas, alternative features such as **Landmark** or **Vegetation** should be used.

##### 5.10.1.1 Dunes, sand hills (see S-4 – B-312.3)

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

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

##### 5.10.1.2 Cliffs (see S-4 – B-312.1)

A coast backed by rock or earth cliffs gives a good radar return and is useful for visual identification from a considerable distance off, where cliffs alternate with low lying coast along the shoreline. Where cliffs are prominent features they should be encoded on the larger maximum display scale for the ENC data; as an exception, where cliffs predominate over extensive stretches of coastline, it may be neither feasible nor particularly useful to insert a cliff throughout. Cliff top heights are useful for calculating or estimating distance off, (for clearing inshore dangers) and should be encoded where possible.

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

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

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

##### Remarks:

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

##### 5.10.1.3 Cuttings and embankments (see S-4 – B-363.2 and B-364.1))

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

Remarks:

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

Distinction: Slope topline.



## 5.11 Slope topline

<b>IHO Definition:</b> <b>SLOPE TOPLINE.</b> The upper marking of a slope, e.g. the ridge line or the separation line between two different gradients. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.160, November 2000).				
<b>S-101 Geo Feature:</b> Slope topline (SLOTOP)				
<b>Primitives:</b> Curve				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of slope	(CATSLO)	1 : cutting 2 : embankment 3 : dune 4 : hill 6 : cliff 7 : scree	EN	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Elevation	(ELEVAT)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Nature of surface	(NATSUR)	1 : mud 2 : clay 3 : silt 4 : sand 5 : stone 6 : gravel 7 : pebbles 8 : cobbles 9 : rock 11 : lava 14 : coral 17 : shells 18 : boulder	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*

Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: C 3; D 14, 15

#### 5.11.1 Slope topline (see S-4 – B-312.1; B-363.2 and B-364.1)

##### 5.11.1.1 Cliffs (see S-4 – B-312.1)

A coast backed by rock or earth cliffs gives a good radar return and is useful for visual identification from a considerable distance off, where cliffs alternate with low lying coast along the shoreline. Where cliffs are prominent features they should be encoded on the larger maximum display scale ENC data; as an exception, where cliffs predominate over extensive stretches of coastline, it may be neither feasible nor particularly useful to insert a cliff throughout. Cliff top heights are useful for calculating or estimating distance off, (for clearing inshore dangers) and should be encoded where possible.

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

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

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

##### Remarks:

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

##### 5.11.1.2 Cuttings and embankments (see S-4 – B-363.2; B-364.1)

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

##### Remarks:

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

**Distinction:** Land elevation; sloping ground.

## 5.12 Pingo

IHO Definition: <b>PINGO</b> . Small conical hills having a large central core of ice formed from the encroachment of permafrost and the resulting hydrostatic pressure. (IHO Dictionary – S-32).				
<b>S-101 Geo Feature: Pingo (PINGOS)</b>				
<b>Primitives:</b> Point, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Exposition of sounding	(EXPSOU)	1 : within the range of depth of the surrounding depth area 2 : shoaler than the range of depth of the surrounding depth area 3 : deeper than the range of depth of the surrounding depth area	EN	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
Quality of sounding measurement	(QUASOU)	1 : depth known 2 : depth or least depth unknown 3 : doubtful sounding 4 : unreliable sounding 5 : no bottom found at value shown 6 : least depth known 7 : least depth unknown, safe clearance at value shown 8 : value reported (not surveyed) 9 : value reported (not confirmed) 10 : maintained depth 11 : not regularly maintained	EN	0,*
Surface quality			C	0,* (ordered)
Nature of surface	(NATSUR)	1 : mud 2 : clay 3 : silt 4 : sand 5 : stone 6 : gravel 7 : pebbles 8 : cobbles	(S) EN	1,1

**Comment [j18]:** MD8 – 4.Co.11 and 4.Cl.9.

		9 : rock 11 : lava 14 : coral 17 : shells 18 : boulder		
Nature of surface – qualifying terms	(NATQUA)	1 : fine 2 : medium 3 : coarse 4 : broken 5 : sticky 6 : soft 7 : stiff 8 : volcanic 9 : calcareous 10 : hard	(S) EN	0,1
Surface layer			(S) IN	0,1
Technique of sounding measurement	(TECSOU)	1 : found by echo-sounder 2 : found by side scan sonar 3 : found by multi-beam 4 : found by diver 5 : found by lead-line 6 : swept by wire-drag 7 : found by laser 8 : swept by vertical acoustic system 9 : found by electromagnetic sensor 10 : photogrammetry 11 : satellite imagery 12 : found by leveling 13 : swept by side-scan sonar 14 : computer generated	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Value of sounding	(VALSOU)		RE	0,1
Vertical datum	(VERDAT)	1 : Mean low water springs 2 : Mean lower low water springs 3 : Mean sea level 4 : Lowest low water 5 : Mean low water 6 : Lowest low water springs 7 : Approximate mean low water springs 8 : Indian spring low water 9 : Low water springs 10 : Approximate lowest astronomical tide 11 : Nearly lowest low water 12 : Mean lower low water 13 : Low water 14 : Approximate mean low water 15 : Approximate mean lower low water 16 : Mean-high-water 17 : Mean-high-water springs 18 : High-water 19 : Approximate mean sea level 20 : High-water-springs 21 : Mean-higher-high-water 22 : Equinoctial spring low water	EN	0,1

**Comment [A19]:** Do not consider that this is needed for PINGOS.

		23 : Lowest astronomical tide 24 : Local datum 25 : International great lakes datum 1985 26 : Mean water level 27 : Lower low water large tide 28 : Higher high water large tide 29 : Nearly highest high water 30 : Highest astronomical tide (HAT)		
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Water level effect	(WATLEV)	1 : partly submerged at high water 2 : always dry 3 : always under water / submerged 4 : covers and uncovers 5 : awash 6 : subject to inundation or flooding 7 : floating	EN	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><u>INT 1 Reference:</u></p> <p><b>5.12.1 Pingo</b></p> <p>If it is required to encode a pingo, either on land or in the water, it must be done using the feature <b>Pingo</b>.</p> <p><u>Remarks:</u></p> <ul style="list-style-type: none"> <li>No remarks.</li> </ul> <p><u>Distinction:</u> Depth area; land area; landmark; sloping ground.</p>				

### 5.13 Tideway

IHO Definition: **TIDEWAY**. A natural water course in intertidal areas where water flows during the ebb or flow. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.181, November 2000).

A channel through which a tidal current runs. (IHO Dictionary – S-32).

#### **S-101 Geo Feature: Tideway (TIDEWY)**

**Primitives:** Curve, Surface

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

#### **INT 1 Reference:**

##### **5.13.1 Tideways (see S-4 – B-413.3)**

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

#### **Remarks:**

- No remarks.

**Distinction:** Canal; river; sea area/named water area.

## 6 Cultural Features

### 6.1 Built-up area

<b>IHO Definition:</b> <b>BUILT-UP AREA.</b> A tract containing a concentration of buildings and/or other structures. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).				
<b>S-101 Geo Feature:</b> Built-up area (BUAARE)				
<b>Primitives:</b> Point, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of built-up area	(CATBUA)	1 : urban area 2 : settlement 3 : village 4 : town 5 : city 6 : holiday village	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,*
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
Radar conspicuous	(CONRAD)		BO	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1

ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p>INT 1 Reference: D 1-4</p> <p><b>6.1.1 Built-up areas (see S-4 – B-370.3-4 and B-370.6-7)</b></p> <p>When representing built-up areas, the aim of the compiler must be to create the correct impression of the extent of the built-up area.</p> <p>If it is required to encode a built-up area, it must be done using the <b>feature Built-Up Area</b>.</p> <p><u>Remarks:</u></p> <ul style="list-style-type: none"> <li>• A built-up area crossed by <b>curve features</b> (e.g. roads, streets, railways) should not be divided into multiple <b>features</b>, unless separate sections of the built-up area have at least one different attribute value.</li> <li>• However, for presentation purposes, a built up area of type <b>surface</b> crossed by a river or canal of type <b>surface</b> must be divided into several <b>features</b>, with the built-up area <b>features</b> not overlapping the river or canal <b>feature</b>. A built up area of type <b>surface</b> should not overlap a lake, dock or lock basin <b>feature</b> of type <b>surface</b>.</li> <li>• Several buildings or built-up areas may be referred to by the same settlement, village or town name on the source. In such cases, the individual buildings or built-up areas should be encoded as separate unnamed <b>features</b>, using the <b>features Building</b> or <b>Built-Up Area</b>, and additionally, an <b>Administration Area (Named) feature</b> (see clause X.X) covering the whole named area should be created with the name encoded using the attribute <b>feature name</b>. The encoded <b>Administration Area (Named) feature</b> should also have the attribute <b>jurisdiction</b> = 3 (national sub-division).</li> <li>• <b>Built-Up Area must be covered by Land Area features of type surface, or be coincident with Land Area features of type point.</b></li> </ul> <p><u>Distinction:</u> Building single; <b>landmark</b>; <b>railway</b>; road; <b>square</b>.</p>				

Comment [j20]: S-58 Check 56.



## 6.2 Building, single

<b>IHO Definition:</b> <b>BUILDING.</b> A free-standing self-supporting construction that is roofed, usually walled, and is intended for human occupancy (for example: a place of work or recreation) and/or habitation. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).				
<b>S-101 Geo Feature:</b> Building (BUISGL)				
<b>Primitives:</b> Point, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Building shape	(BUSHP)	5 : high-rise building 6 : pyramid 7 : cylindrical 8 : spherical 9 : cubic	EN	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Elevation	(ELEVAT)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Function	(FUNCTN)	2 : harbor-master's office 3 : custom office 4 : health office 5 : hospital 6 : post office 7 : hotel 8 : railway station	EN	0,*

		9 : police station 10 : water-police station 11 : pilot office 12 : pilot lookout 13 : bank office 14 : headquarters for district control 15 : transit shed/warehouse 16 : factory 17 : power station 18 : administrative 19 : educational facility 20 : church 21 : chapel 22 : temple 23 : pagoda 24 : Shinto shrine 25 : Buddhist temple 26 : mosque 27 : marabout 28 : lookout 29 : communication 30 : television 31 : radio 32 : radar 33 : light support 34 : microwave 35 : cooling 36 : observation 37 : timeball 38 : clock 39 : control 40 : airship mooring 41 : stadium 42 : bus station 43 : passenger terminal building 44 : sea rescue control 45 : observatory 46 : ore crusher		
Height	(HEIGHT)		RE	0,1
Nature of construction	(NATCON)	1 : masonry 2 : concreted 4 : hard surfaced 5 : unsurfaced 6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted	EN	0,*
Status	(STATUS)	1 : permanent 4 : not in use 6 : reserved 7 : temporary 8 : private 12 : illuminated 13 : historic 14 : public 16 : watched 17 : un-watched 18 : existence doubtful	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*

Comment [j21]: S-57  
Extension 06/01.

Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: D 5-6, 8, 13; E 10.1, 10.3, 11, 13-18, ~~28-30.1~~; F 51, 60-63

**6.2.1 Buildings (see S-4 – B-325; B-328.1; B-362.2; B-370.3; B-370.5; B-372 and B-373.1-4; ~~B-375.1,2; B-487.3~~)**

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

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

Scattered buildings of no individual importance must be omitted when more than about 1 mile inland. Nearer the shore they may be generalised by encoding a few representative buildings, sufficient to give the correct impression of building density.

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

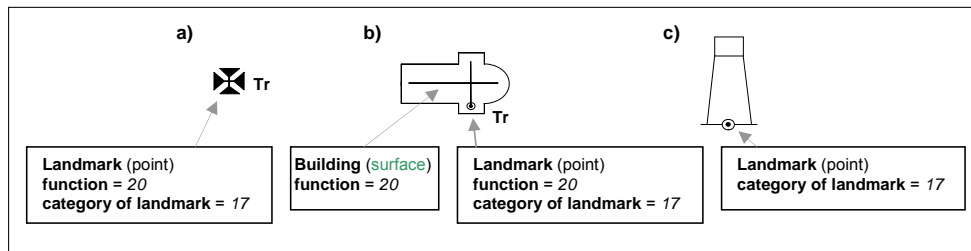
Buildings constructed as places of worship often form significant landmarks; their size and structure incorporating towers, spires, cupolas, etc often render them conspicuous. These buildings when known to be prominent or conspicuous should be encoded up to several miles inland, with sufficient information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

If it is required to encode a building (other than a landmark, tank or silo), it must be done using the **feature Building**.

**Remarks:**

- For landmarks, see clause **X.X**; for silos and tanks, see clause **X.X**. For common encoding combinations, see clause **X.X**.
- A ruined building should be encoded in the same way as the feature in good condition, but with attribute **condition** = 2 (ruined).
- For covered boathouses and other buildings that are located in or partially overlap the navigable water area, any associated **features** should be encoded as they exist in the "real world"; e.g. jetties as **Shoreline Construction**, pontoons as **Pontoon**, mooring posts as **Mooring/Warping Facility**. The roofed area may be covered by a **Building feature** of type **surface**, with attribute **information** = *Boathouse* or *Boatshed*, for example. If the service being provided by the structure is known, **features Small Craft Facility** (see clause **X.X**) or **Harbour Facility** (see clause **X.X**) may also be encoded.
- When a building is shown as a **surface**, indicating its true shape, and it is required to encode a prominent feature such as a tower or spire that is part of the structure, two **features** must be created (see Figure below):

- a **Building feature** of type **surface** for the main building,
- a **Landmark feature** of type **point** for the prominent feature.



### 6.2.2 Harbour offices (see S-4 – B-325)

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

- 2 - harbour-master's office
- 3 - custom office
- 4 - health office
- 11 - pilot office

### 6.2.3 Transit sheds and warehouses (see S-4 – B-328.1)

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

Distinction: Built-up area; coastguard station; landmark; rescue station; **silo**; **tank**.

### 6.3 Airport/airfield

<b>IHO Definition:</b> AIRPORT/AIRFIELD. A defined area on land (including any buildings, installations and equipment) intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).				
<b>S-101 Geo Feature:</b> Airport/airfield (AIRARE)				
<b>Primitives:</b> Point, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of airport/airfield	(CATAIR)	1 : military aeroplane airport 2 : civil aeroplane airport 3 : military heliport 4 : civil heliport 5 : glider airfield 6 : small planes airfield 8 : emergency airfield	EN	0,1
Condition	(COND TN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 12 : illuminated 14 : public 16 : watched 17 : un-watched	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1

Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><u>INT 1 Reference:</u> D 17</p> <p><b>6.3.1 Airfields (see S-4 – B-366)</b></p> <p>Airfields (or airports) within a few miles of the coast must be charted on larger and medium maximum display scale ENC data; they are significant to coastal navigation because of the many visual and aural features associated with them and the related air traffic.</p> <p>For ENC data at larger maximum display scale s, an airport should be encoded using a combination of the following features: <b>Airport/Airfield</b> (surface), <b>Runway</b> (surface or curve), <b>Building</b> (surface or point) and <b>Landmark</b> (surface or point). At least one <b>Airport/Airfield</b> or <b>Runway</b> must be in this set of features. Where it is necessary to establish a relationship between these features, they should be associated using the collection feature <b>C_ASSO</b> (see clause X.X).</p> <p>For ENC data at smaller maximum display scale s, an airport should be encoded as an <b>Airport/Airfield</b> of type point.</p> <p><u>Remarks:</u></p> <ul style="list-style-type: none"> <li>• If individual buildings are visually conspicuous, they must be encoded as separate features.</li> <li>• If it is required to encode the control tower, it must be done using a <b>Landmark feature</b>, with attributes <b>function</b> = 39 (control) and <b>category of landmark</b> = 17 (tower). If it is required to encode other buildings, this must be done using the feature <b>Building</b>.</li> <li>• If it is required to encode a seaplane landing area, it must be done using the feature <b>Seaplane Landing Area</b> (see clause X.X).</li> <li>• For navigational aids associated with air navigation, and air obstruction lights, see clauses related to navigational aids.</li> </ul> <p><u>Distinction:</u> Runway; seaplane landing area.</p>				

## 6.4 Runway

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

A site on which helicopters may land and take off. (IHO Dictionary – S-32).

### **S-101 Geo Feature: Runway (RUNWAY)**

**Primitives:** ~~Point~~, Curve, Surface

Real World		Paper Chart Symbol	ECDIS Symbol		
S-101 Attribute		S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of runway		(CATRUN)	1 : aeroplane runway 2 : helicopter landing pad	EN	0,*
Condition		(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
Date range				C	0,1
Date end		(PEREND)	ISO 8601:1988	(S) DA	0,1
Date start		(PERSTA)	ISO 8601:1988	(S) DA	0,1
Periodic				(S) BO	1,1
Feature name				C	0,*
Category of name			1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language			ISO 639-3	(S) TE	0,1
Name		(OBJNAM)		(S) TE	1,1
Nature of construction		(NATCON)	1 : masonry 2 : concreted 4 : hard surfaced 5 : unsurfaced 6 : wooden 7 : metal 9 : painted	EN	0,*
Status		(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 12 : illuminated 14 : public	EN	0,*
Vertical length		(VERLEN)		RE	0,1
Information				C	0,*
Language			ISO 639-3	(S) TE	0,1
Text		(INFORM)		(S) TE	1,1

Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><b>INT 1 Reference:</b> D 17</p> <p><b>6.4.1 Airfields (see S-4 – B-366)</b></p> <p>Airfields (or airports) within a few miles of the coast must be encoded on large and medium maximum display scale ENC data; they are significant to coastal navigation because of the many visual and aural features associated with them and the related air traffic.</p> <p>For larger maximum display scale s ENC data, an airport should be encoded using a combination of the following features: <b>Airport/Airfield</b> (surface), <b>Runway</b> (surface or curve), <b>Building</b> (surface or point) and <b>Landmark</b> (surface or point). At least one <b>Airport/Airfield</b> or <b>Runway</b> must be in this set of features. Where it is necessary to establish a relationship between these features, they should be associated using the collection feature <b>C_ASSO</b> (see clause X.X).</p> <p><b>Remarks:</b></p> <ul style="list-style-type: none"> <li>• Two or more crossing runways may be encoded as one surface.</li> <li>• If it is required to encode a seaplane landing area, it must be done using the feature <b>Seaplane Landing Area</b> (see clause X.X).</li> <li>• For navigational aids associated with air navigation, and air obstruction lights, see clauses related to navigational aids.</li> </ul> <p><b>Distinction:</b> Airport/airfield; seaplane landing area.</p>				



## 6.5 Bridge

<b>IHO Definition:</b> <b>BRIDGE.</b> A structure erected over a depression or an obstacle such as a body of water, railroad, etc., to provide a roadway for vehicles or pedestrians. (IHO Dictionary – S-32).				
<b>S-101 Geo Feature:</b> Bridge (BRIDGE)				
<b>Primitives:</b> Point, Curve, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of bridge	(CATBRG)	1 : fixed bridge 2 : opening bridge 3 : swing bridge 4 : lifting bridge 5 : bascule bridge 6 : pontoon bridge 7 : draw bridge 8 : transporter bridge 9 : footbridge 10 : viaduct 11 : aqueduct 12 : suspension bridge	EN	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,0
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1

Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Nature of construction	(NATCON)	1 : masonry 2 : concreted 4 : hard-surfaced 5 : unsurfaced 6 : wooden 7 : metal 8 : glass-reinforced plastic (GRP) 9 : painted	EN	0,*
Status	(STATUS)	1 : permanent 2 : occasional 5 : periodic/intermittent 7 : temporary 9 : mandatory 12 : illuminated 16 : watched 17 : un-watched	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: D 20-24

#### 6.5.1 Bridges (see S4 – B-381)

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

The value of the vertical clearance between (high) water level and any fixed overhead obstruction must always be given, where known, on the largest maximum display scale ENC data intended for navigation under the obstruction, and for detailed passage planning. The datum above which clearances are given must be a high water level, preferably Highest Astronomical Tide (HAT), where the tide is appreciable. The value for the vertical clearance must be encoded using the feature **Span** (see clause X.X), with the clearance populated using the mandatory complex attribute **clearance vertical** and sub-attributes populated relevant to the feature, rounded down to the nearest whole metre (unless under 10m, when metres and decimetres may be quoted). In areas where the tidal range is not appreciable the datum above which clearances are given should be Mean Sea Level (MSL).

#### Remarks:

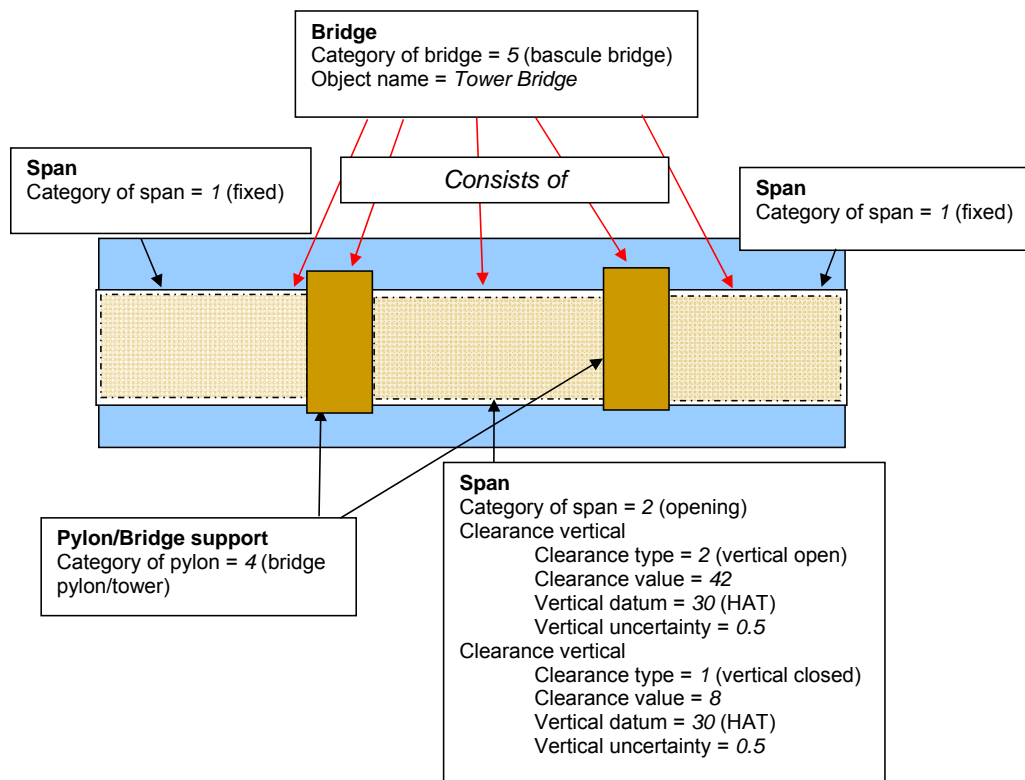
- Water under a bridge must be encoded using the **features Depth Area, Dredged Area or Unsurveyed**

**Area** (and appropriate **Depth Contour** and **Sounding** features) if the waterway is navigable at the maximum display scale for the ENC data, or using the features **Land Area** or **Unsurveyed Area** if the waterway is not navigable at the maximum display scale for the ENC data.

- When there is a fixed vertical clearance, closed vertical clearance, or open vertical clearance given for a bridge, it should be applied only to the portion of the bridge to which it refers, using the feature **Span** (see clause X.X). All encoded bridge spans must be related to the **Bridge** feature through and association. See examples in the Figures below.
- In navigable water, bridge supports must be encoded, where possible, using a **Pylon/Bridge Support** feature (see clause X.X), with attribute **category of pylon** = 4 (bridge/pylon tower) or 5 (bridge pier).
- It is not mandatory to encode roads or railways on bridges.

#### 6.5.2 Examples of Encoding Common Bridge Types

##### OPENING BRIDGE



Distinction: Pipeline, overhead; pylon/bridge support.

## 6.6 Conveyor

**IHO Definition:** **CONVEYOR.** A mechanical device for conveying articles or materials during manufacture or processing using an endless moving belt or series of rollers. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

**S-101 Geo Feature:** Conveyor (CONVYR)

**Primitives:** Curve, Surface

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of conveyor	(CATCON)	1 : aerial cableway (telepheric) 2 : belt conveyor 3 : flume	EN	0,1
Clearance vertical			C	0,1
Clearance type		1-: vertical-closed 2-: vertical-open 3 : vertical fixed 4-: vertical-safe	(S) EN	1,1
Clearance value	(VERCLR)		(S) RE	1,1
Vertical datum	(VERDAT)	1-: Mean-low-water-springs 2-: Mean-lower-low-water-springs 3 : Mean sea level 4-: Lowest-low-water 5-: Mean-low-water 6-: Lowest-low-water-springs 7-: Approximate-mean-low-water-springs 8-: Indian-spring-low-water 9 : Low-water-springs 10-: Approximate-lowest-astronomical-tide 11 : Nearly-lowest-low-water 12 : Mean-lower-low-water 13-: Low-water 14-: Approximate-mean-low-water 15-: Approximate-mean-lower-low-water 16 : Mean high water 17 : Mean high water-springs 18 : High water 19 : Approximate mean sea level 20 : High water springs 21 : Mean higher high water 22-: Equinoctial-spring-low-water 23-: Lowest-astronomical-tide 24 : Local datum 25 : International great lakes datum 1985 26 : Mean water level	(S) EN	0,1

**Comment [j22]:** S-57 Extension 06/01.

		27 : Lower-low-water-large tide 28 : Higher high water large tide 29 : Nearly highest high water 30 : Highest astronomical tide (HAT)		
Vertical uncertainty	(VERACC)		(S) RE	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,0
Height	(HEIGHT)		RE	0,1
Lifting capacity	(LIFCAP)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
Product	(PRODUCT)	4 : stone 5 : coal 6 : ore 7 : chemicals 10 : bauxite 11 : coke 12 : iron ingots 13 : salt 14 : sand 15 : timber 16 : sawdust/wood chips 17 : scrap metal	EN	0,1

		21 : cement 22 : grain		
Status	(STATUS)	1 : permanent 4 : not in use 6 : reserved 12 : illuminated 19 : buoyed	EN	0,*
Radar conspicuous	(CONRAD)		C	0,1
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><b>INT 1 Reference:</b> D 25</p> <p><b>6.6.1 Conveyors (see S-4 – B-382.3)</b></p> <p>If it is required to encode a conveyor, it must be done using the <b>feature Conveyor</b>.</p> <p>The value of the vertical clearance between (high) water level and any fixed overhead obstruction must always be given, where known, on the largest maximum display scale ENC data intended for navigation under the obstruction, and for detailed passage planning. The datum above which clearances are given must be a high water level, preferably Highest Astronomical Tide (HAT), where the tide is appreciable. The value for the vertical clearance must be encoded using the complex attribute <b>clearance vertical</b>, and sub-attributes populated relevant to the feature, rounded down to the nearest whole metre (unless under 10m, when metres and decimetres may be quoted). In areas where the tidal range is not appreciable the datum above which clearances are given should be Mean Sea Level (MSL).</p> <p><b>Remarks:</b></p> <ul style="list-style-type: none"> <li>In navigable water, conveyor supports must be encoded, where possible, using a <b>Pylon/Bridge Support</b> feature (see clause X.X), with attribute <b>category of pylon</b> = 3 (aerial cableway/sky pylon).</li> </ul> <p><b>Distinction:</b> Cable, overhead; pylon/bridge support.</p>				

**Comment [j23]:** S-57  
Extension 06/01.

## 6.7 Overhead cables

**IHO Definition:** **CABLE, OVERHEAD.** An assembly of wires or fibres, or a wire rope or chain, which is supported by structures such as poles or pylons and passing over or nearby navigable waters. (Hydrographic Service, Royal Australian Navy).

**S-101 Geo Feature:** Cable overhead (CBLOHD)

**Primitives:** Curve

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of cable	(CATCBL)	1 : power line 3 : transmission line 4 : telephone 5 : telegraph	EN	0,1
Clearance vertical			C	1,2
Clearance type		1-: vertical-closed 2-: vertical-open 3 : vertical fixed 4 : vertical safe	(S) EN	1,1
Clearance value	(VERCLR)		(S) RE	1,1
Vertical datum	(VERDAT)	1-: Mean-low-water-springs 2-: Mean-lower-low-water-springs 3 : Mean sea level 4-: Lowest-low-water 5-: Mean-low-water 6-: Lowest-low-water-springs 7-: Approximate-mean-low-water-springs 8-: Indian-spring-low-water 9 : Low-water-springs 10-: Approximate-lowest-astronomical-tide 11-: Nearly-lowest-low-water 12-: Mean-lower-low-water 13-: Low-water 14-: Approximate-mean-low-water 15-: Approximate-mean-lower-low-water 16 : Mean high water 17 : Mean high water-springs 18 : High water 19 : Approximate mean sea level 20 : High water springs 21 : Mean higher high water 22-: Equinoctial-spring-low-water 23-: Lowest-astronomical-tide 24 : Local datum 25 : International great lakes datum 1985 26 : Mean water level	(S) EN	0,1

		27 : Lower-low water-large tide 28 : Higher high water large tide 29 : Nearly highest high water 30 : Highest astronomical tide (HAT)		
Vertical uncertainty	(VERACC)		(S) RE	0,1
Condition	(CONDTN)	1 : under construction 5 : planned construction	EN	0,1
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start			(S) DA	0,1
Periodic	(DATSTA)	ISO 8601:1988	(S) BO	0,0
Ice factor	(ICEFAC)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Status	(STATUS)	1 : permanent 4 : not in use 5 : periodic/intermittent 7 : temporary 12 : illuminated <del>19 : buoyed</del>	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<b>INT 1 Reference:</b> D 26, 27 <b>6.7.1 Overhead cables (see S-4 – B-382)</b>				

**Comment [j24]:** S-57  
Extension 06/01.



If it is required to encode an overhead cable, it must be done using the **feature Cable Overhead**.

The value of the vertical clearance between (high) water level and any fixed overhead obstruction must always be given, where known, on the largest maximum display scale ENC data intended for navigation under the obstruction, and for detailed passage planning. The datum above which clearances are given must be a high water level, preferably Highest Astronomical Tide (HAT), where the tide is appreciable. The value for the vertical clearance must be encoded using the complex attribute **clearance vertical**, and sub-attributes populated relevant to the feature, rounded down to the nearest whole metre (unless under 10m, when metres and decimetres may be quoted). In areas where the tidal range is not appreciable the datum above which clearances are given should be Mean Sea Level (MSL).

For power cables or transmission lines carrying very high voltages, an additional vertical clearance of from 2 to 5 metres may be needed to avoid an electrical discharge. When known, the authorised safe clearance (known as the safe vertical clearance), which is the physical clearance minus a safety margin, must be populated using the complex attribute **clearance vertical** having the sub-attributes **clearance type** = 4 (vertical safe) and **clearance value** populated with the safe clearance value.

Remarks:

- If it is required to encode telepheric cables, this must be done using **Conveyor features** (see clause X.X), with attribute CATCON = 1 (aerial cableway (telepheric)).
- Where a cable has radar reflectors, they must be encoded as separate **Radar Reflector features** (see clause X.X). If the whole cable is radar conspicuous, or the **maximum display scale for the ENC data** is too small to show individual reflectors, the **Cable Overhead** should be encoded with attribute **radar conspicuous**.
- In navigable water, overhead cable supports must be encoded, where possible, using a **Pylon/Bridge Support** feature (see clause X.X), with attribute **category of pylon** = 1 or 2.
- All encoded overhead cable **Span** features must be related to the **Cable Overhead** feature through an association.

Distinction: Cable area; cable, submarine; conveyor; pylon/bridge support.

## 6.8 Pipeline, overhead

**IHO Definition: PIPELINE.** A string of interconnected pipes used for the transport of matter, nowadays mainly oil or gas. (IHO Dictionary – S-32).

An overhead pipeline is a pipeline supported by pylons and passing over or nearby navigable waters. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.119, November 2000).

**S-101 Geo Feature:** Pipeline overhead (PIPOHD)

**Primitives:** Curve

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of pipeline/pipe	(CATPIP)	2 : outfall pipe 3 : intake pipe 4 : sewer 6 : supply pipe	EN	0,1
Clearance vertical			C	1,1
Clearance type		1 : vertical-closed 2 : vertical-open 3 : vertical fixed 4 : vertical-safe	(S) EN	1,1
Clearance value	(VERCLR)		(S) RE	1,1
Vertical datum	(VERDAT)	1 : Mean-low-water-springs 2 : Mean-lower-low-water springs 3 : Mean sea level 4 : Lowest-low-water 5 : Mean-low-water 6 : Lowest-low-water springs 7 : Approximate-mean-low water-springs 8 : Indian-spring-low-water 9 : Low-water-springs 10 : Approximate-lowest astronomical-tide 11 : Nearly-lowest-low-water 12 : Mean-lower-low-water 13 : Low-water 14 : Approximate-mean-low water 15 : Approximate-mean lower-low-water 16 : Mean high water 17 : Mean high water springs 18 : High water 19 : Approximate mean sea level 20 : High water springs 21 : Mean higher high water 22 : Equinoctial-spring-low water 23 : Lowest-astronomical tide 24 : Local datum 25 : International great	(S) EN	0,1

		lakes datum 1985 26 : Mean water level 27 : Lower low water large tide 28 : Higher high water large tide 29 : Nearly highest high water 30 : Highest astronomical tide (HAT)		
Vertical uncertainty	(VERACC)		(S) RE	0,1
Condition	(CONDTN)	1 : under construction 5 : planned construction	EN	0,1
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,0
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Product	(PRODCT)	1 : oil 2 : gas 3 : water 7 : chemicals 8 : drinking water 9 : milk 18 : liquefied natural gas (LNG) 19 : liquefied petroleum gas (LPG) 20 : wine 22 : grain	EN	0,1
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 4 : not in use 7 : temporary 12 : illuminated	EN	0,*
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*

Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><u>INT 1 Reference:</u> D 28</p> <p><b>6.8.1 Overhead pipelines (see S-4 – B-383)</b></p> <p>If it is required to encode an overhead pipeline passing over or nearby navigable waters, it must be done using the <b>feature Pipeline Overhead</b>.</p> <p>The value of the vertical clearance between (high) water level and any fixed overhead obstruction must always be given, where known, on the largest maximum display scale ENC data intended for navigation under the obstruction, and for detailed passage planning. The datum above which clearances are given must be a high water level, preferably Highest Astronomical Tide (HAT), where the tide is appreciable. The value for the vertical clearance must be encoded using the complex attribute <b>clearance vertical</b>, and sub-attributes populated relevant to the feature, rounded down to the nearest whole metre (unless under 10m, when metres and decimetres may be quoted). In areas where the tidal range is not appreciable the datum above which clearances are given should be Mean Sea Level (MSL).</p> <p><u>Remarks:</u></p> <ul style="list-style-type: none"> <li>Where an overhead pipeline is disused, it should be encoded with the attribute <b>status = 4</b> (not in use), and the attributes <b>category of pipe</b> and <b>product must</b> not be encoded.</li> </ul> <p><u>Distinction:</u> Pipeline area; pipeline, submarine/on land.</p>				

## 6.9 Span

IHO Definition: <b>SPAN</b> . A section of an overhead structure between piers or supports.				
<b>S-101 Geo Feature:</b> Span				
<b>Primitives:</b> Curve, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
<b>S-101 Attribute</b>	<b>S-57 Acronym</b>	<b>Allowable Encoding Value</b>	<b>Type</b>	<b>Multiplicity</b>
Category of span		1 : fixed 2 : opening	EN	0,1
Clearance horizontal			C	0,*
Clearance type		5 : horizontal open 6 : horizontal closed 7 : horizontal fixed	(S) EN	1,1
Clearance value	(HORCLR)		(S) RE	1,1
Horizontal distance uncertainty	(HORACC)		(S) RE	0,1
Clearance vertical			C	1,*
Clearance type		1 : vertical closed 2 : vertical open 3 : vertical fixed 4 : vertical safe	(S) EN	1,1
Clearance value	(VERCLR)		(S) RE	1,1
Vertical datum	(VERDAT)	1 : Mean-low-water-springs 2 : Mean-lower-low-water springs 3 : Mean sea level 4 : Lowest-low-water 5 : Mean-low-water 6 : Lowest-low-water springs 7 : Approximate-mean-low water-springs 8 : Indian-spring-low-water 9 : Low-water-springs 10 : Approximate-lowest astronomical-tide 11 : Nearly-lowest-low-water 12 : Mean-lower-low-water 13 : Low-water 14 : Approximate-mean-low water 15 : Approximate-mean lower-low-water 16 : Mean high water 17 : Mean high water springs 18 : High water 19 : Approximate mean sea level 20 : High water springs 21 : Mean higher high water 22 : Equinoctial-spring-low water 23 : Lowest-astronomical	(S) EN	0,1

		<p>24 : Local datum</p> <p>25 : International great lakes datum 1985</p> <p>26 : Mean water level</p> <p>27 : Lower-low water large tide</p> <p>28 : Higher high water large tide</p> <p>29 : Nearly highest high water</p> <p>30 : Highest astronomical tide (HAT)</p>		
Vertical uncertainty	(VERACC)		(S) RE	0,1
Time range			C	0,*
Time end	(TIMEND)		(S) TI	1,1
Time start	(TIMSTA)		(S) TI	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale maximum	(SCAMAX)		IN	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

#### INT 1 Reference:

##### 6.9.1 Span

If it is required to encode the clearance characteristics (vertical or horizontal) for part of an overhead structure between piers or supports, it must be done using the feature **Span**, which must be associated to the appropriate related structure feature e.g. **Bridge**, **Overhead Cable** etc. See clause X.X for examples of **Span** features used in conjunction with **Bridge** features.

The value of the vertical clearance between (high) water level and any fixed overhead obstruction must always be given, where known, on the largest optimum display scale ENC data intended for navigation under the obstruction, and for detailed passage planning. The datum above which clearances are given must be a high water level, preferably Highest Astronomical Tide (HAT), where the tide is appreciable. It must be populated using the complex attribute **clearance vertical**, relevant to the feature, rounded down to the nearest whole metre (unless under 10m, when metres and decimetres may be quoted). In areas where the tidal range is not appreciable the datum above which clearances are given should be Mean Sea Level (MSL).

#### Remarks:

- **Span** features should only be encoded if the span is entirely or partly over navigable water at the maximum display scale for the ENC data.
- Encoded **Span** features must be of the same geometric primitive (curve or surface) as the feature to which

**Comment [u25]:** I think that a Span feature(s) should only be encoded when a clearance is known and/or several type of span compose the bridge. For a fixed bridge for which the clearance is unknown, only a Bridge feature should be encoded ( no Span feature) .

**Comment [u26]:** A span is often partly over water and partly over land.

it is associated, and share the geometry of the portion of the associated feature to which the **Span** applies. The attributes **scale maximum** and **scale minimum** must also be populated with the same values as the feature to which it is associated.

- For opening bridge spans the complex attribute **clearance vertical** must be encoded for both the opening (vertical open) and closed (vertical closed) clearance values.
- For fixed bridge spans the complex attribute **clearance vertical** must be encoded for the fixed (vertical fixed) clearance value only.

**Distinction:** Bridge; conveyor; overhead cable; overhead pipeline.

## 6.10 Pylon/bridge support

**IHO Definition:** **PYLON/BRIDGE SUPPORT.** A vertical construction consisting, for example, of a steel framework or pre-stressed concrete to carry cables, a bridge, etc. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.125, November 2000).

**S-101 Geo Feature:** Pylon/bridge support (PYLONS)

**Primitives:** Point, Surface

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of pylon	(CATPYL)	1 : power transmission pylon/pole 2 : telephone/telegraph pylon/pole 3 : aerial cableway/sky pylon 4 : bridge pylon/tower 5 : bridge pier	EN	1,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,0
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1



Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
Nature of construction	(NATCON)	1 : masonry 2 : concreted 6 : wooden 7 : metal 9 : painted	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Water level effect	(WATLEV)	1 : partly submerged at high water 2 : always dry 3 : always under water / submerged 4 : covers and uncovers 5 : awash 6 : subject to inundation or flooding	EN	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: D 26

#### 6.10.1 Pylons and bridge supports (see S-4 – B-381.5 and B-382.1)

The actual position of pylons supporting bridges and cables must be indicated on at least the largest maximum display scale ENC data, where they are positioned in the navigable channel or where likely to be useful for position-fixing.

#### Remarks:

- A Pylon/Bridge Support feature of type surface with attribute water level effect = 1, 2 or 6 must be covered by a Land Area feature of type surface (see clause X.X).

Distinction: Landmark.

Comment [J27]: S-4 text relating to pylons currently under review by CSPCWG.

## 6.11 Fence/wall

<b>IHO Definition:</b> <b>FENCE/WALL.</b> A <b>natural</b> or man-made barrier used as an enclosure or boundary or for protection. (Adapted from <b>Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010</b> ).				
<b>S-101 Geo Feature:</b> Fence/wall (FNCLNE)				
<b>Primitives:</b> Curve				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of fence	(CATFNC)	1 : fence 3 : hedge 4 : wall	EN	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Elevation	(ELEVAT)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
Nature of construction	(NATCON)	1 : masonry 2 : concreted 3 : loose boulders 6 : wooden 7 : metal 9 : painted	EN	0,*

Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 7 : temporary 12 : illuminated 13 : historic	EN	0,*
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><b>INT 1 Reference:</b></p> <p><b>6.11.1 Fences and walls</b></p> <p>If it is required to encode a fence or wall, it must be done using the <b>feature Fence/Wall</b>.</p> <p><u>Remarks:</u></p> <ul style="list-style-type: none"> <li>No remarks.</li> </ul> <p><u>Distinction:</u></p>				

## 6.12 Railway

IHO Definition: **RAILWAY**. A rail or set of parallel rails on which a train, tram, or rail wagon runs. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

### **S-101 Geo Feature: Railway (RAILWY)**

**Primitives:** Curve

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Condition	(CONDTN)	1 : under construction 2 : ruined 3 : under-reclamation 5 : planned construction	EN	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
Status	(STATUS)	1 : permanent 4 : not in use 6 : reserved 12 : illuminated 13 : historic 14 : public 19 : buoyed	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

**Comment [j28]:** S-57 Extension 06/01.

**INT 1 Reference:** D 13

**6.12.1 Railways (see S-4 – B-328.4 and B-362)**

In urbanized areas, depiction of railways within some miles of the coast is part of the ENC's function in giving a general indication of the degree of land development. In largely undeveloped areas, the depiction of railways to isolated ports draws attention to such ports and may be of some maritime interest for transport purposes. Railways should be encoded on larger and medium maximum display scale ENC data.

Where railways run just inshore of the coast, or down to it, together with associated bridges, signal posts and other structure, they provide essential identification features. It should not generally be necessary to depict the smaller associated features - posts, gantries etc.

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

Remarks:

- If it is required to encode a railway station, it must be done using a **Building** feature, with attribute **function** = 8 (railway station). On the largest maximum display scale ENC data, the names of railway terminals or main stations may be populated using the attribute **feature name** for the **Building**.
- Abandoned railways (those which are mostly still intact) should be encoded, if required, as **Railway** with the attribute **status** = 4 (not in use).

Distinction: Road; tunnel.

### 6.13 Road

IHO Definition: <b>ROAD.</b> An open way for the passage of vehicles. (United States Geological Survey, Jan. 89).				
<b>S-101 Geo Feature:</b> Road (ROADWY)				
<b>Primitives:</b> Point, Curve, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
<b>S-101 Attribute</b>	<b>S-57 Acronym</b>	<b>Allowable Encoding Value</b>	<b>Type</b>	<b>Multiplicity</b>
Category of road	(CATROD)	1 : motorway 2 : major road 3 : minor road 4 : track/path 5 : major street 6 : minor street	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Nature of construction	(NATCON)	1 : masonry 2 : concreted 3 : loose boulders 4 : hard surfaced 5 : unsurfaced 6 : wooden 7 : metal 8 : glass-reinforced plastic (GRP) 9 : painted	EN	0,*
Status	(STATUS)	1 : permanent 2 : occasional 3 : recommended 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 9 : mandatory 11 : extinguished 12 : illuminated 13 : historic 14 : public 15 : synchronized 16 : watched 17 : un-watched 18 : existence-doubtful 19 : buoys	EN	0,*

**Comment [j29]:** S-57  
Extension 06/01.

Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><u>INT 1 Reference:</u> D 7, 10-12</p> <p><b>6.13.1 Roads and tracks (see S-4 – B-365)</b></p> <p>On the largest maximum display scale continuous coastal series of ENC's, and larger maximum display scale ENC data, all roads and tracks running down to the coastline should be encoded where the maximum display scale permits. Particular attention must be given to local roads serving minor piers, boat hards and landings. Inland, major roads within a few miles of the coast should be encoded to give a general indication of the degree of development, but tracks and all or some of the minor roads should be omitted. In largely undeveloped areas, with very few roads, it may be desirable to encode even minor roads inland.</p> <p>On smaller maximum display scale ENC data, roads must be omitted.</p> <p>If it is required to encode a road or track, it must be done using the feature <b>Road</b>.</p> <p><u>Remarks:</u></p> <ul style="list-style-type: none"> <li>• <del>Road crossings (attribute CATROD = 7) should not be encoded.</del></li> <li>• No remarks</li> </ul> <p><u>Distinction:</u> Causeway; railway; square.</p>				

## 6.14 Tunnel

<b>IHO Definition: TUNNEL.</b> A passage that is open to the atmosphere at both ends, buried under the seabed or laid over the sea floor or bored under the ground or through mountains. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.191, November 2000).				
<b>S-101 Geo Feature: Tunnel (TUNNEL)</b>				
<b>Primitives:</b> Point, Curve, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Clearance horizontal			C	0,1
Clearance type		5 : horizontal-open 6 : horizontal-closed 7 : horizontal fixed	(S) EN	1,1
Clearance value	(HORCLR)		(S) RE	1,1
Horizontal distance uncertainty	(HORACC)		(S) RE	0,1
Clearance vertical			C	0,1
Clearance type		1 : vertical-closed 2 : vertical-open 3 : vertical fixed 4 : vertical-safe	(S) EN	1,1
Clearance value	(VERCLR)		(S) RE	1,1
Vertical datum	(VERDAT)	1 : Mean-low-water-springs 2 : Mean-lower-low-water springs 3 : Mean sea level 4 : Lowest-low-water 5 : Mean-low-water 6 : Lowest-low-water springs 7 : Approximate-mean-low water-springs 8 : Indian-spring-low-water 9 : Low-water-springs 10 : Approximate-lowest astronomical-tide 11 : Nearly-lowest-low-water 12 : Mean-lower-low-water 13 : Low-water 14 : Approximate-mean-low water 15 : Approximate-mean lower-low-water 16 : Mean high water 17 : Mean high water springs 18 : High water 19 : Approximate mean sea level 20 : High water springs 21 : Mean higher high water 22 : Equinoctial-spring-low water 23 : Lowest-astronomical tide	(S) EN	0,1



		24 : Local datum 25 : International great lakes datum 1985 26 : Mean water level 27 : Lower-low-water-large tide 28 : Higher high water large tide 29 : Nearly highest high water 30 : Highest astronomical tide (HAT)		
Vertical uncertainty	(VERACC)		(S) RE	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Status	(STATUS)	1 : permanent 3 : recommended 4 : not in use 6 : reserved 8 : private 14 : public 16 : watched 17 : un-watched	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><u>INT 1 Reference:</u> D 16</p> <p><b>6.14.1 Tunnels (see S-4 – B-363.1)</b></p> <p>If it is required to encode a tunnel, it must be done using the <b>feature Tunnel</b>.</p> <p><u>Remarks:</u></p>				

- If there is a waterway inside the tunnel, and the waterway is navigable at the maximum display scale for the ENC data, it must be encoded as if it were a navigable canal (see clause X.X), using the features **Depth Area** or **Dredged Area** in conjunction with the **Tunnel feature**. There must be no **Land Area feature** in the area covering the waterway.
- If it is required to encode a waterway inside a tunnel that is not navigable at the maximum display scale for the ENC data, it must be done using the feature **Canal** (see clause X.X) in conjunction with the **Tunnel feature**. A **Land Area feature** must cover the tunnel. The complex attributes **clearance horizontal** and **clearance vertical** must not be encoded on the **Tunnel feature** in this case.
- If it is required to encode a tunnel that has no waterway inside it (but a railway, road etc), only the **Tunnel feature** must be encoded (the section of railway or road inside the tunnel must not be encoded), covered by **Land Area**, **Depth Area**, **Dredged Area** or **Unsurveyed Area features** as appropriate.

Distinction: Railway; road.

## 7 Landmarks

### 7.1 Buildings, landmarks, tanks, silos: Common encoding combinations

In the following table, the symbol '/' indicates that this attribute does not exist for that particular object class. A blank indicates that the encoder may choose a relevant value for the attribute. The table contains the most common examples of coding; other coding combinations are possible.

Feature	INT1	Object-class	function	category of landmark	building shape	product	category of silo/tank
Administrative		Building	18	/		/	/
Bank office		Building	13	/		/	/
Buddhist temple	E16	Building	25	/		/	/
Bus station		Building	42	/		/	/
Cairn	Q100	Landmark	/	1	/	/	/
Cemetery	E19	Landmark		2	/	/	/
Chapel	E11	Building	21	/		/	/
Chimney	E22	Landmark		3		/	
Church	E10.1	Building	20	/		/	/
Church dome, Cupola	E10.4	Landmark	20	15	/	/	/
Church spire	E10.3	Landmark	20	20	/	/	/
Church tower	E10.2	Landmark	20	17	/	/	/
Clock tower		Landmark	38	17	/	/	/
Column	E24	Landmark	/	10	/	/	/
Communication mast		Landmark	29	7	/	/	/
Communication tower		Landmark	29	17	/	/	/
Control tower		Landmark	39	17	/	/	/
Cooling tower		Landmark	35	17	/	/	/
Cross, Calvary	E12	Landmark		14	/	/	/
Custom office	F61	Building	3	/		/	/
Dish aerial	E31	Landmark		4	/	/	/
Dome or cupola, part of a building		Landmark		15	/	/	/
Educational facility		Building	19	/		/	/
Factory		Building	16	/		/	/
Flagstaff, Flagpole	E27	Landmark		5	/	/	/
Flare stack	E23	Landmark		6	/	/	/
Grain elevator		Silo/Tank	/	/		22	3
Harbour-master's office	F60	Building	2	/		/	/
Headquarters for district control		Building	14	/		/	/
Health office	F62.1	Building	4	/		/	/
Hospital	F62.2	Building	5	/		/	/
Hotel	D6	Building	7	/		/	/
House, Building	D5	Building		/		/	/
Large rock or boulder on land		Landmark	/	21	/	/	/

Feature	INT1	Object-class	function	category of landmark	building shape	product	category of silo/tank
Light house (tower)	P1	Landmark	33	17	/	/	/
Light house (other shapes)	P1	Building	33	/		/	/
Lookout station in general		Building	28	/		/	/
Lookout tower		Landmark	28	17	/	/	/
Marabout	E18	Building	27	/		/	/
Mast in general		Landmark		7	/	/	/
Memorial plaque		Landmark		11	/	/	/
Microwave tower		Landmark	34	17	/	/	/
Minaret	E17	Landmark	26	20	/	/	/
Monument	E24	Landmark		9	/	/	/
Mooring mast		Landmark	40	7	/	/	/
Mosque	E17	Building	26	/		/	/
Obelisk	E24	Landmark	/	12	/	/	/
Observation tower		Landmark	36	17	/	/	/
Pagoda	E14	Building	23	/		/	/
Pilot lookout	T2	Building	12	/		/	/
Pilot office	T3	Building	11	/		/	/
Police station		Building	9	/		/	/
Post office	F63	Building	6	/		/	/
Power station		Building	17	/		/	/
Radar dome	E30.4	Landmark	32	15	/	/	/
Radar mast	E30.1	Landmark	32	7	/	/	/
Radar scanner	E30.3	Landmark		16	/	/	/
Radar tower	E30.2	Landmark	32	17	/	/	/
Radio mast	E28	Landmark	31	7	/	/	/
Radio tower	E29	Landmark	31	17	/	/	/
Railway station	D13	Building	8	/		/	/
Shinto shrine	E15	Building	24	/		/	/
Silo	E33	Silo/Tank	/	/			1
Spire, part of a building		Landmark		20	/	/	/
Stadium		Building	41	/		/	/
Statue	E24	Landmark		13	/	/	/
Tank	E32	Silo/Tank	/	/			2
Television mast	E28	Landmark	30	7	/	/	/
Television tower	E29	Landmark	30	17	/	/	/
Temple	E13	Building	22	/		/	/
Timeball tower		Landmark	37	17	/	/	/
Tower	E20	Landmark		17	/	/	/
Tower, part of a building		Landmark		17	/	/	/
Transit shed, Warehouse	F51	Building	15	/		/	/
Water tower	E21	Silo/Tank	/	/	/	3 or 8	4
Water-police station		Building	10	/		/	/

Feature	INT1	Object-class	function	category of landmark	building shape	product	category of silo/tank
Windmill	E25	Landmark		18	/	/	/
Windmotor	E26.1	Landmark		19	/	/	/

## 7.2 Landmark

<b>IHO Definition:</b> <b>LANDMARK.</b> A prominent object at a fixed location which can be used in determining a location or a direction. (Adapted from <b>IHO Dictionary – S-32</b> ).				
<b>S-101 Geo Feature:</b> Landmark (LNDMRK)				
<b>Primitives:</b> Point, Curve, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of landmark	(CATLMK)	1 : cairn 2 : cemetery 3 : chimney 4 : dish aerial 5 : flagstaff (flagpole) 6 : flare stack 7 : mast 8 : windsock 9 : monument 10 : column (pillar) 11 : memorial plaque 12 : obelisk 13 : statue 14 : cross 15 : dome 16 : radar scanner 17 : tower 18 : windmill 19 : windmotor 20 : spire/minaret 21 : large rock or boulder on land 22 : triangulation mark 23 : boundary mark	EN	1,*
Category of special purpose mark	(CATSPM)	1 : firing danger area mark 2 : target mark 3 : marker ship mark 4 : degaussing range mark 5 : barge mark 6 : cable mark 7 : spoil ground mark 8 : outfall mark 9 : ODAS (Ocean Data Acquisition System) 10 : recording mark 11 : seaplane anchorage mark 12 : recreation zone mark 14 : mooring mark 15 : LANBY (Large Automatic Navigational Buoy) 16 : leading mark 17 : measured distance mark 18 : notice mark 19 : TSS mark (Traffic Separation Scheme) 20 : anchoring prohibited mark	EN	0,*

**Comment [A30]:** Taken from CATCTR

**Comment [J31]:** MD8 – 7.Co.10.

		21 : berthing-prohibited mark 22 : overtaking-prohibited mark 23 : two-way-traffic prohibited-mark 24 : reduced-wake-mark 25 : speed-limit-mark 26 : stop-mark 27 : general-warning-mark 28 : sound-ship's-siren-mark 29 : restricted-vertical-clearance-mark 30 : maximum-vessel's draught-mark 31 : restricted-horizontal-clearance-mark 32 : strong-current-warning mark 33 : berthing-permitted-mark 34 : overhead-power-cable mark 35 : channel-edge-gradient mark 36 : telephone-mark 37 : ferry-crossing-mark 39 : pipeline-mark 40 : anchorage-mark 41 : clearing mark 42 : control-mark 43 : diving-mark 44 : refuge-beacon 45 : foul-ground-mark 46 : yachting-mark 47 : heliport-mark 48 : GNSS-mark 49 : seaplane-landing-mark 50 : control-mark 51 : work-in-progress-mark 52 : mark-with-unknown purpose 53 : wellhead-mark 54 : channel-separation mark 55 : marine-farm-mark 56 : artificial-reef-mark 57 : ice-mark		
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1

**Comment [j32]:** S-57  
Extension 06/01.

Condition	(CONDTN)	1 : under construction 2 : ruined 4 : wingless 5 : planned construction	EN	0,1
Elevation	(ELEVAT)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Function	(FUNCTN)	2 : harbor-master's office 3 : custom office 4 : health office 5 : hospital 6 : post office 7 : hotel 8 : railway station 9 : police station 10 : water-police station 11 : pilot office 12 : pilot lookout 13 : bank office 14 : headquarters for district control 15 : transit shed/warehouse 16 : factory 17 : power station 18 : administrative 19 : educational facility 20 : church 21 : chapel 22 : temple 23 : pagoda 24 : Shinto shrine 25 : Buddhist temple 26 : mosque 27 : marabout 28 : lookout 29 : communication 30 : television 31 : radio 32 : radar 33 : light support 34 : microwave 35 : cooling 36 : observation 37 : timeball 38 : clock 39 : control 40 : airship mooring 41 : stadium 42 : bus station 43 : passenger terminal building 44 : sea rescue control 45 : observatory 46 : ore crusher	EN	0,*
Height	(HEIGHT)		RE	0,1
Nature of construction	(NATCON)	1 : masonry 2 : concreted 3 : loose boulders	EN	0,*



		6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted		
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 12 : illuminated 13 : historic 14 : public 16 : watched 17 : un-watched	EN	0,*
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: D 8; E 10.2-10.4, 22-31; L 11; Q 100

#### 7.2.1 Buildings, landmarks, tanks, silos (see S-4 – B-373; B-373.6; B-374.3-7; B-375.1-2; B-445.8-9; B-456.2; B-487.3)

Depending on height and the topographic relief, structures considered to be landmarks should be encoded up to several miles inland.

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

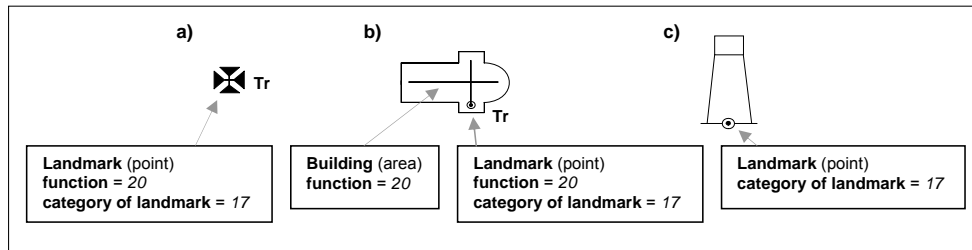
If it is required to encode a landmark (other than a tank or silo), it must be done using the feature **Landmark**.

##### Remarks:

- For buildings, see clause X.X; for silos and tanks, see clause X.X. For common encoding combinations, see clause X.X.
- A water tower must be encoded, where required, using the feature **Silo/Tank** (see clause X.X).
- A ruined landmark should be encoded in the same way as the feature in good condition, but with attribute **condition** = 2 (ruined).

- Radio and television masts and towers are likely to be visible over long distances and should be encoded as landmarks, even when well inland. They will usually carry air obstruction lights.
- To aid identification of landmarks by the mariner it may be useful to add the height of the top of the structure above ground level (**vertical length**) or above the general height datum (**height**).
- Buildings constructed as places of worship often form significant landmarks; their size and structure incorporating towers, spires, cupolas, etc often render them conspicuous. These buildings when known to be prominent or conspicuous should be encoded up to several miles inland (see Figure below, examples (a) and (b)).
- The attribute **category of special purpose mark** should only be used if the **Landmark** is used as the front or rear lead for a transit, clearing line or measured distance, or for a leading line. Values for **category of special purpose mark** such as 16 (leading mark), 17 (measured distance mark) or 41 (clearing mark) in particular should be used for these purposes. See also clause X.X.
- When a building is shown as a **surface**, indicating its true shape, and it is required to encode a prominent feature such as a tower or spire that is part of the structure, two **features** must be created (see Figure below):
  - a **Building feature** of type **surface** for the main building,
  - a **Landmark feature** of type **point** for the prominent feature.

Comment [j33]: MD8 – 8.Co.1



- Not all landmarks are visually conspicuous. If a feature is visually conspicuous (i.e. it is distinctly and noticeably visible from seaward), the attribute **visually conspicuous** must be encoded (see S-4 – B-340).

Distinction: Beacon, special purpose/general; building single; **control point**; daymark; pylon/bridge support; silo/tank; topmark.

Comment [j34]: MD8 – 7.Cl.4 and 7.Co.16

Comment [j35]: MD8 – 7.Cl.4 and 7.Co.16

### 7.3 Silo/tank

IHO Definition: <b>SILO/TANK</b> . An enclosed container, used for storage. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).				
<b>S-101 Geo Feature: Silo/tank (SILTANK)</b>				
<b>Primitives:</b> Point, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Building shape	(BUISHP)	5 : high-rise building 6 : pyramid 7 : cylindrical 8 : spherical 9 : cubic	EN	0,1
Category of silo/tank	(CATSIL)	1: silo in general 2: tank in general 3: grain elevator 4: water tower	EN	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Elevation	(ELEVAT)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
Nature of construction	(NATCON)	1 : masonry 2 : concreted	EN	0,*

		6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted		
Product	(PRODC)	1 : oil 2 : gas 3 : water 7 : chemicals 8 : drinking water 9 : milk 14 : sand 18 : liquefied natural gas (LNG) 19 : liquefied petroleum gas (LPG) 20 : wine 21 : cement 22 : grain	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 4 : not in use 12 : illuminated 13 : historic	EN	0,*
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p>INT 1 Reference: E 2, 32-33</p> <p><b>7.3.1 Tanks, silos (see S-4 – B-340.2 and B-376)</b></p> <p>Isolated tanks or gasholders may be good landmarks and should be represented true to scale (i.e. as surface) where possible (to enable tangents to their sides to be used in position-fixing). Groups of tanks, as at a refinery, may be useful for general identification of position but cannot usually be used for precise position-fixing because of uncertainty of the location of individual tanks.</p> <p>If it is required to encode a tank or silo, it must be done using the feature <b>Silo/Tank</b>.</p> <p><u>Remarks:</u></p> <ul style="list-style-type: none"> <li>For buildings, see clause X.X; for landmarks, see clause X.X. For common encoding combinations, see clause X.X.</li> </ul>				

- Groups of tanks in close proximity (tank farm) must be encoded, where required, using the feature **Production/Storage Area** (see clause X.X). Individual, visually conspicuous tanks within a tank farm may be encoded as **Silo/Tank** within the **Production/Storage Area**.

Distinction: Building, single; control point; landmark; production/storage area.

## 7.4 Fortified structure

IHO Definition: <b>FORTIFIED STRUCTURE</b> . A structure that is specifically designed or reinforced to provide for defense from armed attack. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).				
<b>S-101 Geo Feature: Fortified structure (FORSTC)</b>				
<b>Primitives:</b> Point, Curve, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of fortified structure	(CATFOR)	1 : castle 2 : fort 3 : battery 4 : blockhouse 5 : fortified tower 6 : redoubt 8 : fortified submarine shelter	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined	EN	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
Nature of construction	(NATCON)	1 : masonry 2 : concreted 3 : loose boulders 6 : wooden 7 : metal 9 : painted	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 3 : recommended 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 9 : mandatory 11 : extinguished 12 : illuminated 13 : historic 14 : public 15 : synchronized 16 : watched 17 : un-watched 18 : existence doubtful	EN	0,*

Comment [J36]: MD8 – 7.Co.1

Comment [J37]: Extension  
6/01

		19 : buoyed		
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><b>INT 1 Reference:</b> E 34.1-3</p> <p><b>7.4.1 Fortified structures (see S-4 – B-379)</b></p> <p>Some coastlines have prominent defensive structures, often disused, decayed, or used for non-defence purposes. Such structures range from major castles and forts to minor lookout posts and may be the main distinctive features of headlands or stretches of coastline. National regulations permitting, any such features as are likely to be visible from seaward and should be encoded on the largest maximum display scale ENC data.</p> <p>If it is required to encode a fortified structure, it must be done using the <b>feature Fortified Structure</b>.</p> <p><b>Remarks:</b></p> <ul style="list-style-type: none"> <li>A <b>Fortified Structure feature</b> with attribute <b>category of fortified structure</b> = 5 (Martello tower) should be used to encode any fortified tower or small round fort used for coastal defence.</li> </ul> <p><b>Distinction:</b> Building, single; <b>landmark</b>.</p>				

**Comment [j38]:** S-57  
Extension 06/01.

## 7.5 Production/storage area

<b>IHO Definition:</b> <b>PRODUCTION/STORAGE AREA.</b> An area on land for the exploitation or storage of natural resources. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.124, November 2000).				
<b>S-101 Geo Feature:</b> Production/storage area (PRDARE)				
<b>Primitives:</b> Point, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of production area	(CATPRA)	1 : quarry 2 : mine 3 : stockpile 4 : power station area 5 : refinery area 6 : timber yard 7 : factory area 8 : tank farm 9 : wind farm 10 : slag heap/spoil heap	EN	1,1
Condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,0
Elevation	(ELEVAT)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
Product	(PRODUCT)	1 : oil 2 : gas 3 : water 4 : stone 5 : coal 6 : ore 7 : chemicals 8 : drinking water 9 : milk 10 : bauxite 11 : coke 12 : iron ingots 13 : salt 14 : sand 15 : timber	EN	0,*



		16 : sawdust/wood chips 17 : scrap metal 18 : liquefied natural gas (LNG) 19 : liquefied petroleum gas (LPG) 20 : wine 21 : cement 22 : grain		
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 4 : not in use 8 : private 12 : illuminated 19 : buoy	EN	0,*
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

Comment [j39]: S-57  
Extension 06/01.

INT 1 Reference: E 26.2, 35.1-2, 36; F 52

#### 7.5.1 Production and storage areas (see S-4 – B-328.2; 367; 374.6)

Production or storage areas located in close proximity to the coast are often prominent landmarks used by mariners to assist in position-fixing. Features such as quarry faces, stockpiles, power stations, refineries, timber stacks in timber yards, factories, groups of tanks and wind motors, and slag heaps should be shown on the largest maximum display scale ENC data.

If it is required to encode production or storage area, it must be done using the feature **Production/Storage Area**.

##### Remarks:

- If there are individual buildings or equipment features contained within this area, they should be encoded as separate features such as **Building**, **Crane**, **Landmark** or **Silo/Tank** within the **Production/Storage Area** surface feature if the maximum display scale of the ENC data permits.
- If visible from seaward, a quarry face should be encoded in a similar way to a cliff (see clause X.X), with attribute **category of slope** = 6 (cliff).
- **Production/Storage Area** features of type point and having the mandatory attribute **category of production area** = empty (null) value do not display in ECDIS. Encoders wishing to display these features in ECDIS must consider alternate encoding options (e.g. using **Building**, **Landmark**, **Obstruction**, or populating a value for **category of production area** from the enumerate list).

Distinction: Free port area; offshore production area.

## 8 Ports

### 8.1 Works in progress and projected (see S-4 – B-329)

An ENC can seldom show the exact state of work under construction because it may not be known by the encoder and, even if known, must be expected to change between ENC updates (see clause X.X). Where it is possible to provide the mariner with an indication of the status of work under construction, under reclamation or planned, it must be done using the appropriate feature (e.g. **Shoreline Construction**, **Causeway**, **Dock Area**, **Dry Dock**, **Pipeline Submarine/On Land**), with the attribute **condition** populated as 1 (under construction), 3 (under reclamation) or 5 (planned construction). Where the encoder wishes to provide such information to the mariner and the details of the works are not known (nature and extent of the works), this should be done using the feature **Caution Area** (see clause X.X), with known details of the works populated using the complex attribute **information** or through a text file referenced by the complex attribute **textual description**.

If it is required to provide the mariner with an indication of the date to which information regarding the works is current, it must be done using the attribute **source date** (see clause X.X).

The coastline existing before the beginning of the works should remain encoded as a **Coastline** or **Shoreline Construction** feature until the completion of the works.

As the works progress and further information is supplied to the Producing Authority, ENC datasets should be updated appropriately through the issue of updates to the dataset or publication of new editions of the dataset (see clause X.X).

On completion of the works, full encoding of the of the new feature(s) in accordance with the relevant clauses in this document must be achieved, and incorporated in the relevant ENC dataset through the issue of an update to the dataset or publication of a new edition of the dataset (see clause X.X).

#### 8.1.1 Works on land (see S-4 – B-329.1)

Features likely to be prominent from seaward should be encoded as described above, where possible. New docks, locks, canals, etc, being excavated should be encoded similarly. The works must be covered by the feature **Land Area** (see clause X.X) until completion of the works.

#### 8.1.2 Works at sea (see S-4 – B-329.2-5)

Works at sea which will extend the coastline seaward, where the line of the future coastline (including piers, etc) is known, must be encoded, where required, as described in clause 8.1 above, using the appropriate features. The existing coastline should remain until the works are completed and the new coastline has been established. The area of reclamation or construction must also be covered by the appropriate feature(s) from Group 1. This may be **Depth Area** at commencement of the works, or if the works are planned and have not yet commenced; **Unsurveyed Area** while reclamation/construction is in progress but the area is still covered by water; or **Land Area** where the area of the works has been reclaimed (i.e. is always dry).

Works at sea which will be wholly or partly submerged when completed, such as training walls or pipelines must be encoded, if required, using the appropriate feature relevant to the completed feature, in accordance with clause 8.1 above. The appropriately attributed depth information, if known, or **Unsurveyed Area**, must cover the works as appropriate.

Where the extent or nature of the works is unknown, they must be encoded, where required, using the feature **Caution Area** as described in clause 8.1 above.

Because lights and buoys marking the limits of works at sea may be moved without notice, they should be encoded only where it is considered safe to do so. Alternatively, this information may be included by populating the complex attribute **information** for the feature(s) comprising the works with, for instance, *Outer end marked by red lights*.

## 8.2 Checkpoint

<b>IHO Definition:</b> <b>CHECKPOINT.</b> An official location at which to register, declare and/or inspect goods and/or people. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).				
<b>S-101 Geo Feature:</b> Checkpoint (CHKPNT)				
<b>Primitives:</b> Point, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
<b>S-101 Attribute</b>	<b>S-57 Acronym</b>	<b>Allowable Encoding Value</b>	<b>Type</b>	<b>Multiplicity</b>
Category of checkpoint	(CATCHP)	1 : custom	EN	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Status	(STATUS)	1 : permanent 2 : occasional 5 : periodic/intermittent 7 : temporary 9 : mandatory 12 : illuminated 16 : watched 17 : un-watched	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<b>INT 1 Reference:</b>				
<b>8.2.1 Checkpoints</b>				
If it is required to encode an official place to register, declare and/or check goods and people, it must be done				

using the **feature Checkpoint**.

Remarks:

- The **Checkpoint** must only be used to encode the function **(NOTE: Checkpoint of type point does not display in ECDIS)**. In addition, if it is required to encode a physical **feature** (e.g. building, fence, gate), it must be done using an appropriate **feature** (e.g. **Building, Landmark**).

Distinction: Custom zone.

Comment [J40]: ENC EB No.  
29

### 8.3 Hulks

IHO Definition: <b>HULK</b> . A permanently moored ship. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.83, November 2000).				
<b>S-101 Geo Feature:</b> Hulk (HULKES)				
<b>Primitives:</b> Point, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of hulk	(CATHLK)	1 : floating restaurant 2 : historic ship 3 : floating museum 4 : floating accommodation 5 : floating breakwater 6 : casino 7 : training vessel	EN	0,*
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Horizontal length	(HORLEN)		RE	0,1
Horizontal width	(HORWID)		RE	0,1
Radar conspicuous	(CONRAD)		BO	0,1
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1

Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><u>INT 1 Reference:</u> F 34</p> <p><b>8.3.1 Hulks</b> (see S-4 – B-330)</p> <p>If it is required to encode a <b>permanently moored ship</b>, it must be done using the <b>feature Hulk</b>.</p> <p><u>Remarks:</u></p> <ul style="list-style-type: none"> <li>• <b>Hulk features</b> of type <b>surface</b> are part of Group 1.</li> <li>• A <b>Hulk feature</b> of type <b>surface</b> must not be bound by <b>curve features Coastline or Shoreline Construction</b>, unless the edge associated with the <b>curve feature</b> is also the boundary of a <b>Land Area feature</b> of type <b>surface</b>.</li> <li>• If it is required to encode a floating production, storage and off-loading vessel, it must be done using the <b>feature Offshore Platform</b> (see clause X.X), with attribute <b>category of offshore platform = 8</b> (floating production, storage and off-loading vessel (FPSO)).</li> <li>• If it is required to encode a floating breakwater, it must be done using the <b>feature Shoreline Construction</b> (see clause X.X), with attributes <b>category of shoreline construction = 1</b> (breakwater) and <b>water level effect = 7</b> (floating).</li> </ul> <p><u>Distinction:</u> Offshore platform; shoreline construction; wreck.</p>				

**Comment [j41]:** Draft S-4 – Refer CSPCWG Letter 03/2011.

## 8.4 Piles

<b>IHO Definition:</b> <b>PILE.</b> A long heavy timber or section of steel, wood, concrete, etc., forced into the earth or seabed which may serve as a support, as for a pier, or a free standing pole within a marine environment. (IHO Dictionary – S-32).				
<b>S-101 Geo Feature: Pile (PILPNT)</b>				
<b>Primitives:</b> Point, Curve				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of pile	(CATPLE)	1 : stake 3 : post 4 : tripodal 5 : piling 6 : row of piles	EN	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,0
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1

**Comment [A42]:** S-57  
Extension 6/01.

**Comment [J43]:** S-57  
Extension 6/01.



Radar conspicuous	(CONRAD)		BO	0,1
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

Comment [A44]: S-57  
Extension 6/01.

INT 1 Reference: F 22

#### 8.4.1 Piles (see S-4 – B-327.3)

If it is required to encode a pile or post that is not used as a mooring/warping facility or an aid to navigation, it must be done using the feature **Pile**.

##### Remarks:

- Stumps of piles or posts that are dangerous to navigation must be encoded, where required, using **Obstruction features** (see clause X.X), with attribute **category of obstruction** = 1 (snag/stump), and must not be encoded using **Pile**.
- Stakes and posts that are identified on the source to serve the purpose of aids to navigation must be encoded, where required, using the appropriate beacon feature (e.g. **Beacon Special Purpose/General**), with attribute **beacon shape** = 1 (stake, pole, perch, post).
- Where the source indicates the existence of a navigation aid equipment feature (see clause X.X), but there is no indication as to the type or shape of the structure feature, a **Pile** feature must be encoded as the master feature (see clause X.X).
- See clause X.X for details of how to encode a pile or post that is used as a mooring/warping facility.
- Where an encoded **Crane, Building, Fortified Structure, Landmark or Silo/Tank** feature of type point is situated in the water and there is no indication on the source as to the structure that supports the feature, a **Pile** feature must be encoded coincident.

Comment [j45]: S-58 test 54.

**Distinction:** Beacon, cardinal; beacon, isolated danger; beacon, lateral; beacon, safe water; beacon special purpose/general; mooring/warping facility.

## 8.5 Dyke

IHO Definition: <b>DYKE</b> . A dyke (or dike) is an artificial embankment to contain or hold back water. (IHO Dictionary – S-32).				
<b>S-101 Geo Feature: Dyke (DYKCON)</b>				
<b>Primitives:</b> Curve, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>		<i>ECDIS Symbol</i>	
<b>S-101 Attribute</b>	<b>S-57 Acronym</b>	<b>Allowable Encoding Value</b>	<b>Type</b>	<b>Multiplicity</b>
Condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,0
Height	(HEIGHT)		RE	0,1
Nature of construction	(NATCON)	1 : masonry 2 : concreted 3 : loose boulders 4 : hard surfaced 5 : unsurfaced 6 : wooden 7 : metal 9 : painted	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Vertical length	(VERLEN)		RE	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)		DA	0,1
Recording indication	(RECIND)	ISO 8601:1988	TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: F 1

#### 8.5.1 Dykes (see S-4 – B-313.1)

Dykes and seawalls are primarily designed to prevent inundation, and generally have regular outlines.

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

Remarks:

- If it is required to encode a dyke whose seaward edge is coincident with the coastline, it must be done using **Dyke**, and with a **Shoreline Construction feature** of type **curve** along its seaward edge, with no value populated for attribute **category of shoreline construction**.
- When a **Dyke feature** is of type **surface**, it must be covered by a **Land Area feature**.
- At large compilation scales, the dyke crown (the topline of the dyke) may be encoded as a **Slope Topline feature** (see clause X.X), with attribute **category of slope** = 2 (embankment).

Distinction: Dam; sloping ground; slope top line.

## 8.6 Shoreline construction

IHO Definition: <b>SHORELINE CONSTRUCTION.</b> A fixed artificial structure in the water and/or adjoining the land. It may also refer to features such as training walls, which are not necessarily connected to, nor form part of the shoreline. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.154, November 2000, as amended).				
<b>S-101 Geo Feature:</b> Shoreline construction (SLCONS)				
<b>Primitives:</b> Point, Curve, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of shoreline construction	(CATSLC)	1 : breakwater 2 : groyne (groyne) 3 : mole 4 : pier (jetty) 5 : promenade pier 6 : wharf (quay) 7 : training wall 8 : rip rap 9 : revetment 10 : sea wall 11 : landing steps 12 : ramp 13 : slipway 14 : fender 15 : solid face wharf 16 : open face wharf 17 : log ramp 18 : swimming facility	EN	0,1
Clearance horizontal			C	0,1
Clearance type		5 : horizontal open 6 : horizontal closed 7 : horizontal fixed	(S) EN	1,1
Clearance value	(HORCLR)		(S) RE	1,1
Horizontal distance uncertainty	(HORACC)		(S) RE	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Condition	(COND TN)	1 : under construction	EN	0,1

**Comment [j46]:** MD8 – 3.Cl.4 and 3.Co.3

**Comment [j47]:** Extension 6/01.

		2 : ruined 3 : under reclamation 5 : planned construction		
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,0
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
Horizontal length	(HORLEN)		RE	0,1
Horizontal width	(HOWWID)		RE	0,1
Nature of construction	(NATCON)	1 : masonry 2 : concreted 3 : loose boulders 4 : hard surfaced 5 : unsurfaced 6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 3 : recommended 4 : not in use 6 : reserved 7 : temporary 8 : private <del>9 : mandatory</del> 12 : illuminated 13 : historic 14 : public <del>16 : watched</del> <del>17 : un-watched</del> 19 : buoyed	EN	0,*
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Water level effect	(WATLEV)	1 : partly submerged at high water 2 : always dry 3 : always under water / submerged 4 : covers and uncovers 5 : awash 6 : subject to inundation or flooding 7 : floating	EN	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1

Comment [J48]: S-57  
Extension 06/01.

Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

**INT 1 Reference:** F 2.1, 2.2, 4.1-6.3, 12-15, 23, 30-33.2

#### 8.6.1 Coastline

Natural sections of coastlines, lakeshores and riverbanks should be encoded as **Coastline** (see clause X.X), whereas artificial sections of coastlines, lakeshores, riverbanks, canal banks and basin borders should be encoded as **Shoreline Construction**. The exception to this general rule is when a lake, river, canal, or basin is not navigable at the **maximum display scale for the ENC data**, in which case the boundaries must not be encoded as **Coastline** or **Shoreline Construction**.

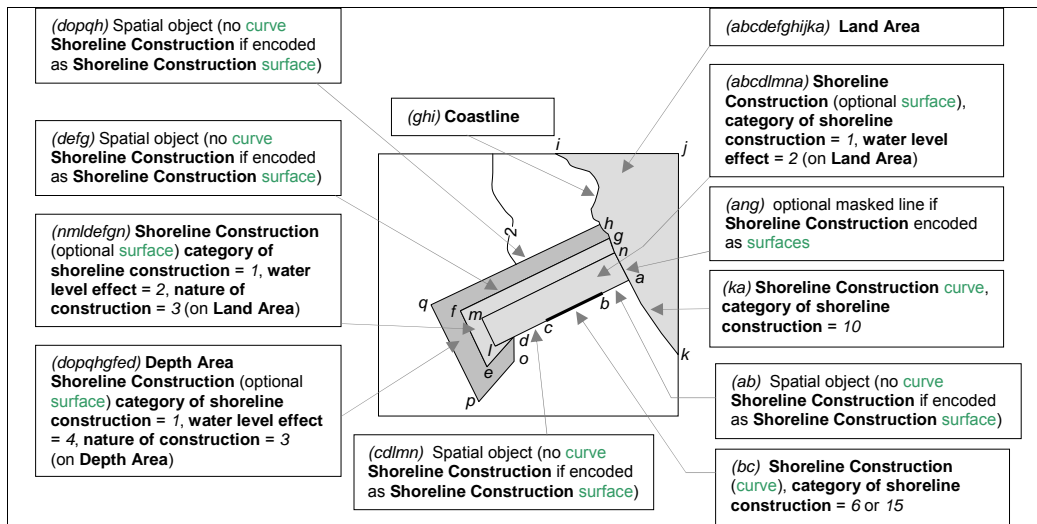
These **features** form the border of the **Land Area feature**.

#### 8.6.2 Artificial coastline (see S-4 – B-313; B-320-322; B-324 and B-329)

If it is required to encode artificial sections of coastlines; or lakeshores, riverbanks, canal banks and basin borders that are navigable at the **maximum display scale for the ENC data**, this must be done using the feature **Shoreline Construction**.

The **largest optimum scale ENC data** should make clear whether any shoreline construction along the coastline is intended for ships to berth alongside or not. In most instances, the associated detail (name or berth number, depths alongside, dolphins, cargo sheds, cranes or railway lines), in addition to the usually distinctive outline of such features as piers and jetties, will be sufficient to show that ships may come alongside. For shoreline constructions not intended to berth alongside (such as breakwaters and seawalls), an indication that ships do not go alongside may be given by encoding the sloping sides (e.g. the intertidal portion of the structure). If there is a possibility of misinterpretation by the mariner, the danger may be indicated by encoding an **Obstruction surface feature** (see clause X.X) with the seaward edge running parallel to the shoreline construction.

The Figure below represents a shoreline construction such as a mole, including a berthing facility (INT1 - F12), with a relatively flat top (*abcdlmna*), and sloping sides partly above high water (*nmldefgn*) and partly intertidal (*dopqrhgfed*).



#### Remarks:

- Each of the three **surface** parts of the **example** shoreline construction **above** may be encoded as separate **Shoreline Construction features** of type **surface**; the masked **curve** (**ang**) **must be encoded**; and, if part of the **Shoreline Construction** boundary has a different characteristic (e.g. (**bc**) attribute **category of shoreline construction** = 6 or 15), it should be encoded as a separate **Shoreline Construction feature** of type **curve**. Alternatively, **all** the boundaries of the **components of the shoreline construction** may be encoded as **Shoreline Construction features** of type **curve**.
- In this example, the shoreline construction **surface** above the high water line must also be covered by a **Land Area feature** of type **surface**, and the intertidal shoreline construction **surface** must also be covered by a **Depth Area feature** of type **surface** with attribute **Depth range minimum value** = -H (see clause X.X).
- Shoreline Construction features** **must** be broken into their constituent parts **where possible**, and categorised using attributes such as **category of shoreline construction** and **water level effect** as indicated on the source.
- If the presence of a feature is only indicated on the source by a textual reference, without a clear symbol (e.g. 'pier', 'groyne', 'post'), it should be encoded using a **Caution Area feature** (see clause X.X) with the textual reference encoded using the complex attribute **information**.
- Intertidal or submerged artificial rock walls, such as training walls that are not attached to the shoreline, **must** be encoded, **if required**, as **Shoreline Construction** using the appropriate value for **category of shoreline construction**, and **water level effect** = 3 (always under water/submerged) or **water level effect** = 4 (covers and uncovers).

**Distinction:** Canal bank; **causeway**; coastline; **dry dock**; **floating dock**; **gridiron**; land area; pontoon.

## 8.7 Causeway

IHO Definition: <b>CAUSEWAY</b> . A raised way across low or wet ground or water. (IHO Dictionary – S-32).				
<b>S-101 Geo Feature:</b> Causeway (CAUSWY)				
<b>Primitives:</b> Curve, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
<b>S-101 Attribute</b>	<b>S-57 Acronym</b>	<b>Allowable Encoding Value</b>	<b>Type</b>	<b>Multiplicity</b>
Condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Nature of construction	(NATCON)	1 : masonry 2 : concreted 3 : loose boulders 4 : hard surfaced 5 : unsurfaced 6 : wooden 7 : metal	EN	0,*
Status	(STATUS)	1 : permanent 7 : temporary 8 : private 12 : illuminated 14 : public	EN	0,*
Water level effect	(WATLEV)	1 : partly submerged at high water 2 : always dry 3 : always under water submerged 4 : covers and uncovers 5 : awash 6 : subject to inundation or flooding	EN	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1



Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><u>INT 1 Reference:</u> F 3</p> <p><b>8.7.1 Causeways (see S-4 – B-313.3)</b></p> <p>A causeway is a raised roadway of solid structure built primarily to provide a route across wet ground or an intertidal area.</p> <p>If it is required to encode a causeway, it must be done using the feature <b>Causeway</b>.</p> <p><u>Remarks:</u></p> <ul style="list-style-type: none"> <li>No remarks.</li> </ul> <p><u>Distinction:</u> Dam; road.</p>				

## 8.8 Canal

<b>IHO Definition:</b> <b>CANAL.</b> An artificial waterway with no flow, or a controlled flow, used for navigation, or for draining or irrigating land (ditch). (United States Geological Survey, Jan.89).				
<b>S-101 Geo Feature:</b> Canal (CANALS)				
<b>Primitives:</b> Curve, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of canal	(CATCAN)	1 : transportation 2 : drainage 3 : irrigation	EN	0,1
Clearance horizontal			C	0,1
Clearance type		5 : horizontal open 6 : horizontal closed 7 : horizontal fixed	(S) EN	1,1
Clearance value	(HORCLR)		(S) RE	1,1
Horizontal distance uncertainty	(HORACC)		(S) RE	0,1
Condition	(COND TN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,0
Horizontal width	(HOWWID)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Status	(STATUS)	1 : permanent 3 : recommended 4 : not in use 5 : periodic/intermittent 6 : reserved 8 : private 14 : public 19 : buoyed	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*

**Comment [j49]:** S-57  
Extension 06/01.

File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: F 40

#### 8.8.1 Canals (see S-4 – B-361)

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

##### Remarks:

- If the canal is navigable at **the maximum display scale for the ENC data**, it must be encoded using the **features Depth Area** or **Dredged Area** (see clause X.X), and the canal banks must be encoded using the **features Coastline** or **Shoreline Construction**. The canal must not be encoded as a **Canal feature**. If it is required to encode the name of the canal, it must be done using a **Sea Area/Named Water Area feature**, with attribute **category of sea area** = 51 (canal).
- Where the canal is navigable at **the maximum display scale for the ENC data**, special consideration should be given to encoding features specific to the canal such as minimum depths within the navigable area; overhead clearances; distances along the canal; and locks and lock gates (and any associated traffic signals).
- If it is required to encode a canal that is not navigable at **the maximum display scale for the ENC data**, it must be done using **Canal**, covered by a **Land Area** or **Unsurveyed Area feature**. The name of the canal should be encoded using the complex attribute **feature name** on the **Canal feature**.

Distinction: River; lake; tideway.

## 8.9 Distance mark

<b>IHO Definition:</b> <b>DISTANCE MARK.</b> A distance mark indicates the distance measured from an origin and consists of either a solid visible structure or a distinct location without special installation. Usually found on canals. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.55, November 2000).				
<b>S-101 Geo Feature:</b> Distance mark (DISMAR)				
<b>Primitives:</b> Point				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of distance mark	(CATDIS)	1 : distance mark not physically installed 2 : visible mark, pole 3 : visible mark, board 4 : visible mark, unknown shape	EN	0,1
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,0
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Waterway distance			C	0,1
Distance			(S) RE	1,1
Distance unit of measure		1 : metres 2 : yards 3 : kilometres 4 : miles	(S) EN	1,1
Reference location			(S) TE	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1

Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><u>INT 1 Reference:</u> B 25.1-2</p> <p><b>8.9.1 Distance marks (see S-4 – B-307 and B-361.3)</b></p> <p>Marks which indicate distances along a channel in nautical miles, kilometres or some other unit of measure are considered to be useful on the largest maximum display scale ENC data.</p> <p>If it is required to encode a distance mark, it must be done using the feature <b>Distance Mark</b>.</p> <p><u>Remarks:</u></p> <ul style="list-style-type: none"> <li>No remarks.</li> </ul> <p><u>Distinction:</u> Beacon, special purpose.</p>				

## 8.10 Gate

<b>IHO Definition:</b> <b>GATE.</b> A structure that may be swung, drawn, or lowered to block an entrance or passageway. (United States Geological Survey, January 1989).				
<b>S-101 Geo Feature:</b> Gate (GATCON)				
<b>Primitives:</b> Point, Curve, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of gate	(CATGAT)	2 : flood barrage gate 3 : caisson 4 : lock gate 5 : dyke gate 6 : sluice	EN	0,1
Clearance horizontal			C	0,1
Clearance type		5 : horizontal open <del>6 : horizontal-closed</del> <del>7 : horizontal-fixed</del>	(S) EN	1,1
Clearance value	(HORCLR)		(S) RE	1,1
Horizontal distance uncertainty	(HORACC)		(S) RE	0,1
Clearance vertical			C	1,*
Clearance type		<del>1 : vertical-closed</del> 2 : vertical open <del>3 : vertical-fixed</del> <del>4 : vertical-safe</del>	(S) EN	1,1
Clearance value	(VERCLR)		(S) RE	1,1
Vertical datum	(VERDAT)	<del>1 : Mean-low-water-springs</del> <del>2 : Mean-lower-low-water-springs</del> 3 : Mean sea level <del>4 : Lowest-low-water</del> <del>5 : Mean-low-water</del> <del>6 : Lowest-low-water-springs</del> <del>7 : Approximate-mean-low-water-springs</del> <del>8 : Indian-spring-low-water</del> <del>9 : Low-water-springs</del> <del>10 : Approximate-lowest-astronomical-tide</del> <del>11 : Nearly-lowest-low-water</del> <del>12 : Mean-lower-low-water</del> <del>13 : Low-water</del> <del>14 : Approximate-mean-low-water</del> <del>15 : Approximate-mean-lower-low-water</del> 16 : Mean high water 17 : Mean high water-springs 18 : High water 19 : Approximate mean sea level 20 : High water springs	(S) EN	0,1

		21 : Mean higher high water 22 : Equinoctial spring-low water 23 : Lowest astronomical tide 24 : Local datum 25 : International great lakes datum 1985 26 : Mean water level 27 : Lower-low water large tide 28 : Higher high water large tide 29 : Nearly highest high water 30 : Highest astronomical tide (HAT)		
Vertical uncertainty	(VERACC)		(S) RE	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Depth range minimum value	(DRVAL1)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Nature of construction	(NATCON)	1 : masonry 2 : concreted 6 : wooden 7 : metal 9 : painted	EN	0,*
Quality of sounding measurement	(QUASOU)	2 : depth or least depth unknown 3 : doubtful sounding 4 : unreliable sounding 6 : least depth known 7 : least depth unknown, safe clearance at value shown	EN	0,*
Sounding uncertainty	(SOUACC)		RE	0,1
Status	(STATUS)	1 : permanent 4 : not in use 6 : reserved 16 : watched 17 : un-watched 19 : buoyed	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1

**Comment [j50]:** MD8 – 4.Co.11 and 4.Cl.9.

**Comment [j51]:** S-57 Extension 06/01.

Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><u>INT 1 Reference:</u> F 27, 41.1-2, 42-43</p> <p><b>8.10.1 Gates (see S-4 – B-326.5-7)</b></p> <p>If it is required to encode a gate that controls the flow of water, it must be done using the <b>feature Gate</b>. <b>Gates should always be encoded in the closed (to the sea) position.</b></p> <p><u>Remarks:</u></p> <ul style="list-style-type: none"> <li>• <b>Gate</b> of type <b>surface</b> must also be covered by a <b>Depth Area</b>, <b>Unsurveyed Area</b> or <b>Land Area feature</b>.</li> <li>• The attribute <b>depth range minimum value</b> is used to encode the minimum depth over the sill, where known.</li> </ul> <p><u>Distinction:</u> Dry dock; floating dock.</p>				



## 8.11 Dam

IHO Definition: <b>DAM</b> . A barrier to check or confine anything in motion; particularly one constructed to hold back water and raise its level to form a reservoir, or to prevent flooding. (IHO Dictionary – S-32).				
<b>S-101 Geo Feature: Dam (DAMCON)</b>				
<b>Primitives:</b> Point, Curve, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of dam	(CATDAM)	1 : weir 2 : dam 3 : flood barrage	EN	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Condition	(COND TN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,0
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
Nature of construction	(NATCON)	1 : masonry 2 : concreted	EN	0,*

		3 : loose boulders 4 : hard surfaced 5 : unsurfaced 6 : wooden 7 : metal 9 : painted		
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 3 : recommended 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 9 : mandatory 11 : extinguished 12 : illuminated 13 : historic 14 : public 15 : synchronized 16 : watched 17 : un-watched 18 : existence-doubtful 19 : buoyed	EN	0,*
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p>INT 1 Reference: F 43, 44</p> <p><b>8.11.1 Dams (see S-4 –B-364.2)</b></p> <p>If it is required to encode a dam, <b>weir or flood barrage</b>, it must be done using the <b>feature Dam</b>.</p> <ul style="list-style-type: none"> <li>When a <b>Dam feature</b> is of type <b>surface</b>, it must be covered by a <b>Land Area feature</b>.</li> <li>The geometry of the dam includes any gates. Gates should be encoded as separate <b>Gate features</b>.</li> <li>If it is required to encode a dam whose seaward edge is coincident with the coastline, it must be done using <b>Dam</b>, with a <b>Shoreline Construction</b> feature of type <b>curve</b> along its seaward edge, with no value populated for the attribute <b>category of shoreline construction</b>.</li> <li>If it is required to encode a submerged weir, it should be done using an <b>Obstruction feature</b> (see clause X.X), with attribute <b>information</b> = <i>Submerged weir</i>.</li> </ul>				

Comment [j52]: S-57  
Extension 06/01.

**8.11.2 Flood barrages (see S-4 –B-326.7)**

If it is required to encode the fixed part of a flood barrage, and the flood barrage is inside an area which is navigable at compilation scale, it must be done using a **Dam feature**, with attribute **category of dam** = 3 (flood barrage), and must be covered by a **Land Area feature**. If it is required to encode the opening part of the flood barrage, it must be done using a **Gate feature**, with attribute **category of gate** = 2 (flood barrage gate), and must be covered by a **Depth Area feature**.

When an encoded flood barrage is inside an area that is not navigable at **the maximum display scale for the ENC data**, the gates need not be encoded. In this case, the **Dam feature** must go all the way across the river or lake.

Distinction: Causeway; dyke; road.

## 8.12 Crane

<b>IHO Definition:</b> <b>CRANE.</b> A machine for lifting, shifting and lowering objects or materials by means of a swinging boom or with a lifting apparatus supported on an overhead track. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).				
<b>S-101 Geo Feature: Crane (CRANES)</b>				
<b>Primitives:</b> Point, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of crane	(CATCRN)	2 : container crane/gantry 3 : sheerlegs 4 : travelling crane 5 : A-frame	EN	0,1
Clearance vertical			C	0,1
Clearance type		1-: vertical-closed 2-: vertical-open 3 : vertical fixed 4-: vertical-safe	(S) EN	1,1
Clearance value	(VERCLR)		(S) RE	1,1
Vertical datum	(VERDAT)	1-: Mean-low-water-springs 2-: Mean-lower-low-water-springs 3 : Mean sea level 4-: Lowest-low-water 5-: Mean-low-water 6-: Lowest-low-water-springs 7-: Approximate-mean-low-water-springs 8-: Indian-spring-low-water 9 : Low-water-springs 10-: Approximate-lowest-astronomical-tide 11 : Nearly-lowest-low-water 12 : Mean-lower-low-water 13-: Low-water 14-: Approximate-mean-low-water 15-: Approximate-mean-lower-low-water 16 : Mean high water 17 : Mean high water-springs 18 : High water 19 : Approximate mean sea level 20 : High water springs 21 : Mean higher high water 22-: Equinoctial-spring-low-water 23-: Lowest-astronomical-tide 24 : Local datum 25 : International great lakes datum 1985 26 : Mean water level	(S) EN	0,1

		27 : Lower-low water-large tide 28 : Higher high water large tide 29 : Nearly highest high water 30 : Highest astronomical tide (HAT)		
Vertical uncertainty	(VERACC)		(S) RE	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
Lifting capacity	(LIFCAP)		RE	0,1
Orientation	(ORIENT)		RE	0,1
Radar conspicuous	(CONRAD)		BO	0,1
Radius	(RADIUS)		RE	0,1
Status	(STATUS)	1 : permanent 4 : not in use 6 : reserved 12 : illuminated	EN	0,*
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*

File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)		DA	0,1
Recording indication	(RECIND)	ISO 8601:1988	TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: F 53.1-3

**8.12.1 Cranes (see S-4 – B-328.3)**

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

Remarks:

- The purpose of charting these features is primarily to assist the mariner in identifying particular berths, etc.
- The attribute **orientation** is used, where required, to encode the angular distance from true north to the axis of the crane's jib (generally perpendicular to the wharf).
- The position of a sheerleg or a travelling crane is defined as its resting position. If it is required to encode the track, it must be done using the **feature Railway** (see clause X.X).

Distinction:

### 8.13 Berth

IHO Definition: <b>BERTH</b> . A named or numbered place where a vessel is moored at a wharf. (IHO Dictionary – S-32).				
<b>S-101 Geo Feature: Berth (BERTHS)</b>				
<b>Primitives:</b> Point, Curve, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Depth range minimum value	(DRVAL1)		RE	0,1
Feature name			C	1,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Maximum authorised draught			RE	0,1
Quality of sounding measurement	(QUASOU)	1 : depth known 2 : depth <del>or least depth</del> unknown <del>3 : doubtful sounding</del> <del>4 : unreliable sounding</del> 6 : least depth known 10 : maintained depth 11 : not regularly maintained	EN	0,*
Sounding uncertainty	(SOUACC)		RE	0,1
Status	(STATUS)	1 : permanent 2 : occasional 5 : periodic/intermittent 7 : temporary 9 : mandatory 12 : illuminated 16 : watched 17 : un-watched	EN	0,*
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1

Comment [j53]: MD8 – 4.Co.11 and 4.Cl.9.

Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: F 12, 19

#### 8.13.1 Berths (see S-4 – ~~B-321; B-321.6-9~~)

Numbered, named or lettered berth information must be encoded on at least the largest maximum display scale ENC data, in order to assist the mariner in berthing activities within ports and harbours.

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

##### Remarks:

- The berth encodes the named place where a vessel can be moored adjacent to a shoreline construction. The shoreline construction itself should be encoded using the feature **Shoreline Construction** (see clause X.X).
- The mandatory complex attribute **feature name** is used to encode the name or number of the berth. The attributes **depth range minimum value** and **maximum authorised draught** are used to encode the shoalest physical depth and maximum draught permitted at the berth respectively, where known.
- Landing places for boats should be encoded as small craft facilities (see clause X.X).
- For encoding anchor berths, see clause X.X.

Distinction: Anchor berth; dock area; mooring/warping facility; shoreline construction.

**Comment [j54]:** Refer CSPCWG Letter 03/2011.



## 8.14 Mooring/warping facility

IHO Definition: **MOORING/WARPING FACILITY**. The equipment or structure used to secure a vessel. (Adapted from *IHO Dictionary – S-32*).

### **S-101 Geo Feature: Mooring/warping facility (MORFAC)**

**Primitives:** Point, Curve, Surface

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Buoy shape	(BOYSHP)	1 : conical (nun, ogival) 2 : can (cylindrical) 3 : spherical 4 : pillar 5 : spar (spindle) 6 : barrel (tun) 7 : <i>superbuoy</i> 8 : ice buoy	EN	0,1
Category of mooring/warping facility	(CATMOR)	1 : dolphin 2 : deviation dolphin 3 : bollard 4 : tie-up wall 5 : post or pile 6 : chain/wire/cable 7 : mooring buoy	EN	1,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
<i>Date range</i>			C	0,2
<i>Date end</i>		ISO 8601:1988	(S) DA	0,1
<i>Date start</i>		ISO 8601:1988	(S) DA	0,1
<i>Periodic</i>			(S) BO	0,1
Elevation	(ELEVAT)		RE	0,1
Exposition of sounding	(EXPSOU)	1 : within the range of depth	EN	0,1

		of the surrounding depth area 2 : shoaler than the range of depth of the surrounding depth area 3 : deeper than the range of depth of the surrounding depth area		
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
Nature of construction	(NATCON)	1 : masonry 2 : concreted 6 : wooden 7 : metal 9 : painted	EN	0,*
Quality of sounding measurement	(QUASOU)	2 : depth or least depth unknown 3 : doubtful sounding 4 : unreliable sounding 6 : least depth known 7 : least depth unknown, safe clearance at value shown	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 3 : recommended 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 12 : illuminated 14 : public 18 : existence doubtful	EN	0,*
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Water level effect	(WATLEV)	1 : partly submerged at high water 2 : always dry 3 : always under water / submerged 4 : covers and uncovers 5 : awash 6 : subject to inundation or flooding	EN	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*

Comment [j55]: MD8 – 4.Co.11 and 4.Cl.9.

File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: F 20-22; Q 40-43

#### 8.14.1 Mooring / warping facilities (see S-4 – B-327.1-4; B-431.5-6)

If it is required to encode a mooring/warping facility, it must be done using the **feature Mooring/Warping Facility**.

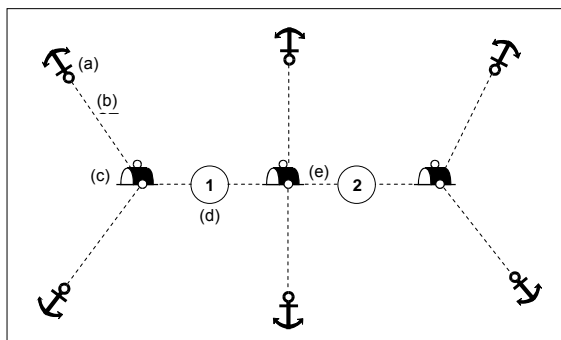
##### Remarks:

- If it is required to encode a pile or post that is used as a mooring post, it must be done using **Mooring/Warping Facility**, with attribute **category of mooring/warping facility** = 5 (pile or post). If the pile or post is not used as a mooring post, see clause X.X.
- Stumps of mooring posts dangerous to navigation must be encoded using the **feature Obstruction**, with attribute **category of obstruction** = 1 (snag/stump). If such stumps are not dangerous to navigation, they must be encoded using **Mooring/Warping Facility**, with attributes **category of mooring/warping facility** = 5 (pile or post) and **condition** = 2 (ruined).
- A **Mooring/Warping Facility** **feature** of type **surface**, with attribute **water level effect** = 1, 2 or 6 must also be covered by a **Land Area** **feature**.

##### 8.14.1.1 Mooring buoys (see S-4 – B-431.5)

If it is required to encode a mooring buoy, it must be done using a **Mooring/Warping Facility** **feature**, with attribute **category of mooring/warping facility** = 7 (mooring buoy). The attribute **buoy shape** must only be populated for a mooring/warping facility when encoding a mooring buoy.

##### 8.14.1.2 Mooring trots (see S-4 – B-431.6)



A complete mooring trot is composed of ground tackle, mooring cables, buoys and mooring berths on junction cables. The following remarks refer to the annotations in the Figure above:

- (a) Ground tackle should be encoded using **Obstruction** **features** (see clause X.X), with attribute **category of obstruction** = 9 (ground tackle).
- (b) Mooring cables should be encoded using **Cable Submarine** **features** (see clause X.X), with attribute **category of cable** = 6 (mooring cable/chain).
- (c) Buoys should be encoded using **Mooring/Warping Facility** **features**, with attribute **category of**

- mooring/warping facility** = 7 (mooring buoy).
- (d) Mooring berths should be encoded using **Berth features**.
- (e) Junction cables should be encoded using **Mooring/Warping Facility features**, with attribute **category of mooring/warping facility** = 6 (chain/wire/cable).

All these objects should be aggregated using the collection **feature C\_AGGR** (see clause **X.X**).

Distinction: Buoy, special purpose/general; **pile**.

## 8.15 Dry dock

IHO Definition: <b>DRY DOCK</b> . An artificial basin fitted with a gate or caisson, into which vessels can be floated and the water pumped out to expose the vessel's bottom. Also called graving dock. (IHO Dictionary – S-32).				
<b>S-101 Geo Feature: Dry dock (DRYDOC)</b>				
<b>Primitives:</b> Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Condition	(COND TN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
Clearance horizontal			C	0,1
Clearance type		5 : horizontal-open 6 : horizontal-closed 7 : horizontal fixed	(S) EN	1,1
Clearance value	(HORCLR)		(S) RE	1,1
Horizontal distance uncertainty	(HORACC)		(S) RE	0,1
Depth range minimum value	(DRVAL1)		RE	0,1
Elevation	(ELEVAT)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Horizontal length	(HORLEN)		RE	0,1
Horizontal width	(HORWID)		RE	0,1
Maximum authorised draught			RE	0,1
Quality of sounding measurement	(QUASOU)	2 : depth or least depth unknown 3 : doubtful sounding 4 : unreliable sounding 6 : least depth known 7 : least depth unknown, safe clearance at value shown 8 : value reported (not surveyed) 9 : value reported (not confirmed)	EN	0,*
Sounding uncertainty	(SOUACC)		RE	0,1
Status	(STATUS)	1 : permanent 4 : not in use 6 : reserved 8 : private	EN	0,*

Comment [J56]: MD8 – 4.Co.11 and 4.Cl.9.

		12 : illuminated 14 : public		
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: F 25

#### 8.15.1 Dry docks (see S-4 – B-326.1)

A dry dock (or graving dock) is an artificial basin into which a ship can be floated for cleaning and repairs. The entrance can be closed by gate or caisson and the water pumped out to expose the vessel's bottom.

If it is required to encode a dry dock, it must be done using the **feature Dry Dock**.

Remarks:

- A dry dock must also be covered by a **Land Area feature**. The boundary of a dry dock must not be encoded as a separate **feature (Coastline or Shoreline Construction)**, except for the gate **feature (Gate)**, which may be encoded.
- The attributes **depth range minimum value** and **maximum authorised draught** are used to encode the shoalest physical depth in the dock when the gate is open and maximum draught permitted in the dock respectively, where known.

Distinction: Dock area; floating dock; gate; shoreline construction.

## 8.16 Floating dock

**IHO Definition:** **FLOATING DOCK.** A form of dry dock consisting of a floating structure of one or more sections which can be partly submerged by controlled flooding to receive a vessel, then raised by pumping out the water so that the vessel's bottom can be exposed. (IHO Dictionary – S-32).

### **S-101 Geo Feature: Floating dock (FLODOC)**

**Primitives:** **Point, Curve, Surface**

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Clearance horizontal			C	0,1
Clearance type		5 : horizontal open 6 : horizontal closed 7 : horizontal fixed	(S) EN	1,1
Clearance value	(HORCLR)		(S) RE	1,1
Horizontal distance uncertainty	(HORACC)		(S) RE	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,0
Depth range minimum value	(DRVAL1)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1

Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Horizontal length	(HORLEN)		RE	0,1
Horizontal width	(HORWID)		RE	0,1
Lifting capacity	(LIFCAP)		RE	0,1
Maximum authorised draught			RE	0,1
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 4 : not in use 6 : reserved 7 : temporary 8 : private 12 : illuminated	EN	0,*
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: F 26

#### 8.16.1 Floating docks (see S-4 – B-326.2)

If it is required to encode a floating dock, it must be done using the **feature Floating Dock**.

##### Remarks:

- A **Floating Dock** feature of type **surface** must not be bound by curve features **Coastline** or **Shoreline Construction**, unless the edge associated with the curve feature is also the boundary of a **Land Area** feature of type **surface**.
- The attribute **depth range minimum value** is used to encode the shoalest depth of the dock when flooded, and the attribute **maximum authorised draught** is used to encode the maximum draught permitted in the dock, where known.

Distinction: Dock area; dry dock.



## 8.17 Pontoon

IHO Definition: **PONTOON**. A floating structure, usually rectangular in shape, which serves as landing, pier head, or bridge support, etc. (Adapted from IHO Dictionary – S-32).

Comment [J57]: MD8 – 4.Co.7 and 4.CL5

**S-101 Geo Feature: Pontoon (PONTON)**

**Primitives:** Point, Curve, Surface

Real World

Paper Chart Symbol

ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Function	(FUNCTN)	2 : harbor-master's office 3 : custom office 4 : health office 5 : hospital 6 : post office 7 : hotel 8 : railway station 9 : police station 10 : water police station 11 : pilot office 12 : pilot lookout 13 : bank office 14 : headquarters for district control 15 : transit shed/warehouse 16 : factory 17 : power station 18 : administrative 19 : educational facility 20 : church 21 : chapel 22 : temple 23 : pagoda 24 : Shinto shrine 25 : Buddhist temple 26 : mosque 27 : marabout 28 : lookout 29 : communication 30 : television	EN	0,*

Comment [A58]: MD8 – 7.Co.7.

		31 : radio 32 : radar 33 : light support 34 : microwave 35 : cooling 36 : observation 37 : timeball 38 : clock 39 : control 40 : airship mooring 41 : stadium 42 : bus station 43 : passenger terminal building 44 : sea rescue control 45 : observatory 46 : ore crusher		
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 12 : illuminated 14 : public	EN	0,*
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><b>INT 1 Reference:</b> F 16</p> <p><b>8.17.1 Pontoons (see S-4 – B-324.3)</b></p> <p>If it is required to encode a pontoon, it must be done using the <b>feature Pontoon</b>.</p> <p><b>Remarks:</b></p> <ul style="list-style-type: none"> <li>A <b>Pontoon</b> feature of type <b>surface</b> must not be bound by curve features <b>Coastline</b> or <b>Shoreline Construction</b>, unless the edge associated with the curve feature is also the boundary of a <b>Land Area</b> feature of type <b>surface</b>.</li> </ul> <p><b>Distinction:</b> Bridge; mooring/warping facility; shoreline construction.</p>				

**Comment [J59]:** Refer CSPCWG Letter 03/2011.

**Comment [A60]:** NOTE: All reference to Pontoon of type area being part of Group 1 has been removed.

## 8.18 Dock area

IHO Definition: <b>DOCK AREA.</b> An artificially enclosed area within which ships may moor and which may have gates to regulate water level. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.56, November 2000).				
<b>S-101 Geo Feature: Dock area (DOCARE)</b>				
<b>Primitives:</b> Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of dock	(CATDOC)	1: tidal 2: non-tidal (wet dock)	EN	0,1
Clearance horizontal			C	0,*
Clearance type		5: horizontal-open 6: horizontal-closed 7: horizontal fixed	(S) EN	0,1
Clearance value	(HORCLR)		(S) RE	1,1
Horizontal distance uncertainty	(HORACC)		(S) RE	0,1
Condition	(CONDTN)	1: under construction 2: ruined 3: under reclamation 5: planned construction	EN	0,1
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,0
Feature name			C	0,*
Category of name		1: official name 2: alternate name 3: common name 4: short name 5: display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Status	(STATUS)	1: permanent 4: not in use 6: reserved 8: private 14: public	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1

Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: F 27, 28

#### 8.18.1 Tidal and non-tidal basins (see S-4 – B-326.3-4)

If it is required to encode a non-navigable dock area, it must be done using the feature **Dock Area**.

##### Remarks:

- If the dock is navigable at the maximum display scale of the ENC data, it must be encoded using the features **Depth Area** or **Dredged Area** (see clause X.X), and the geo features making up the dock limits must be encoded using appropriate features such as **Coastline**, **Shoreline Construction** or **Gate**. The dock must not be encoded as **Dock Area**. If it is required to encode the name of the dock, it must be done using the feature **Sea Area/Named Water Area**.
- If it is required to encode a dock which is not navigable at the maximum display scale of the ENC data, it must be done using the feature **Dock Area**, covered by a **Land Area** or **Unsurveyed Area** feature. The name of the dock should be encoded using the complex attribute **feature name** on the **Dock Area**. The boundary of a dock must not be encoded as a separate feature (e.g. **Coastline**, **Shoreline Construction**), except for the gate feature (**Gate**) for a non-tidal dock, which may be encoded.
- The complex attribute **clearance horizontal** is used to encode the size of the entrance to the dock area, where required.
- In a non-tidal basin, depths may refer to a sounding datum different to that in open waters. If this area is navigable at the maximum display scale of the ENC data, the value of this datum must be encoded using the meta feature **Sounding Datum**, with attribute **vertical datum** = 24 (local datum), co-incident with the area covered by the dock.
- In reality, smaller dock areas may be included in major dock areas, with different names or characteristics. To encode this fact, dock areas (**Dock Area**) and/or sea areas (**Sea Area/Named Water Area**) may overlap. In cases where **Dock Area** and **Sea Area/Named Water Area** overlap, the **Dock Area** must also be covered by **Unsurveyed Area**.

Distinction: Berth; cargo transshipment area; dry dock; floating dock; gate; harbour area (administrative); harbour facility.

## 8.19 Gridiron

**IHO Definition: GRIDIRON.** A structure in the intertidal zone serving as a support for vessels at low stages of the tide to permit work on the exposed portion of the vessel's hull. Also called careening grid. (IHO Dictionary – S-32).

**S-101 Geo Feature: Gridiron (GRIDRN)**

**Primitives:** Point, Surface

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Horizontal length	(HORLEN)		RE	0,1
Horizontal width	(HORWID)		RE	0,1
Nature of construction	(NATCON)	1 : masonry 2 : concreted 6 : wooden 7 : metal 9 : painted	EN	0,*
Status	(STATUS)	1 : permanent 4 : not in use 6 : reserved 8 : private 14 : public 19 : buoyed	EN	0,*
Vertical length	(VERLEN)		RE	0,1
Water level effect	(WATLEV)	1 : partly submerged at high water 4 : covers and uncovers 5 : awash	EN	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1

**Comment [j61]:** S-57  
Extension 06/01.

Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><u>INT 1 Reference:</u> F 24</p> <p><b>8.19.1 Gridirons (see S-4- B-326.8)</b></p> <p>If it is required to encode a gridiron, it must be done using the <b>feature Gridiron</b>.</p> <p><u>Remarks:</u></p> <ul style="list-style-type: none"> <li>Due to gridirons normally being located in intertidal areas, it is only required to encode <b>Gridiron</b> on the largest maximum display scale <b>ENC</b> data.</li> </ul> <p><u>Distinction:</u> Dry dock; floating dock.</p>				

## 8.20 Locks

IHO Definition: **LOCK BASIN**. A wet dock in a waterway, permitting a ship to pass from one level to another. (IHO Dictionary – S-32).

**S-101 Geo Feature: Lock basin (LOKBSN)**

**Primitives:** Surface

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Clearance horizontal			C	0,1
Clearance type		5 : horizontal-open 6 : horizontal-closed 7 : horizontal fixed	(S) EN	1,1
Clearance value	(HORCLR)		(S) RE	1,1
Horizontal distance uncertainty	(HORACC)		(S) RE	0,1
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,0
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Horizontal length	(HORLEN)		RE	0,1
Horizontal width	(HORWID)		RE	0,1
Status	(STATUS)	1 : permanent 4 : not in use 6 : reserved 8 : private 13 : historic 14 : public 16 : watched 17 : un-watched 19 : buoys	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1

**Comment [j62]:** S-57  
Extension 06/01.

Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: F 41.1

#### 8.20.1 Locks (see S-4 – B-326.6)

A lock is an enclosure at the entrance to a canal or non-tidal basin. Its ends are closed by lock gates.

If it is required to encode a non-navigable lock basin, it must be done using the feature **Lock Basin**.

#### Remarks:

- If the lock is navigable at the maximum display scale of the ENC data, it must be encoded using the features **Depth Area** or **Dredged Area** (see clause X.X), and the geo features making up the limits of the lock must be encoded using appropriate features such as **Coastline**, **Shoreline Construction** or **Gate**. The lock must not be encoded as **Lock Basin**. If it is required to encode the name of the lock, it must be done using the feature **Sea Area/Named Water Area**.
- If it is required to encode a lock that is not navigable at the maximum display scale of the ENC data, it must be done using **Lock Basin** covered by a **Land Area** or **Unsurveyed Area** feature. The name of the lock should be encoded using the complex attribute **feature name** on the **Lock Basin** feature.
- The gates should be encoded as a **Gate** feature (see clause X.X) with attribute **category of gate** = 4 (lock gate) or 3 (caisson). For smaller maximum display scale ENC data, a lock may be encoded using **Gate** only, without using **Lock Basin**.

Distinction: Canal; gate.



## 9 Topographic Terms

### 9.1 Sea area/named water area

<b>IHO Definition:</b> SEA AREA/NAMED WATER AREA. A geographically defined part of the sea or other navigable waters. It may be specified within its limits by its proper name. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.151, November 2000).				
<b>S-101 Geo Feature:</b> Sea area/named water area (SEAARE)				
<b>Primitives:</b> Point, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of sea area	(CATSEA)	2 : gat 3 : bank 4 : deep 5 : bay 6 : trench 7 : basin 8 : mud flats 9 : reef 10 : ledge 11 : canyon 12 : narrows 13 : shoal 14 : knoll 15 : ridge 16 : seamount 17 : pinnacle 18 : abyssal plain 19 : plateau 20 : spur 21 : shelf 22 : trough 23 : saddle 24 : abyssal hills 25 : apron 26 : archipelagic apron 27 : borderland 28 : continental margin 29 : continental rise 30 : escarpment 31 : fan 32 : fracture zone 33 : gap 34 : guyot 35 : hill 36 : hole 37 : levee 38 : median valley 39 : moat 40 : mountains 41 : peak 42 : province 43 : rise 44 : sea channel 45 : seamount chain 46 : shelf-edge 47 : sill	EN	0,1

		48 : slope 49 : terrace 50 : valley 51 : canal 52 : lake 53 : river 54 : reach		
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

#### INT 1 Reference:

##### 9.1.1 Sea areas (see S-4 – B-550)

Undersea features and sea areas in general, including intertidal areas, may be identified by their names and may be delimited by the **spatial types** used by other geo **features** (e.g. depth contours, coastlines). If it is required to encode these areas, this must be done using the **feature Sea Area/Named Water Area**.

#### Remarks:

- At least one of the complex attribute **feature name** or the attribute **category of sea area** must be populated for **Sea Area/Named Water Area**.
- This **feature** has a use similar to that of the **feature Land Region** (see clause X.X), but for the sea.
- A **Sea Area/Named Water Area feature** of type **surface** should be bounded, if possible, by existing **curves** used by other **features** (e.g. **Depth Contour**, **Coastline**). If necessary, however, this **surface** may be bounded by other **curves** created to close the **surface**, or to describe a new **surface**.
- **Sea Area/Named Water Area features** of type **surface** may overlap.
- For additional guidance on encoding geographic names, see clause X.X.

**Distinction:** **Administration area (named)**; depth area; seabed area.

## 10 Tides, Currents

### 10.1 Tidal data (see S-4 – B-406 to B-408)

The inclusion of tidal information in ENC datasets is optional.

For Standard Ports the appropriate national Hydrographic Office or an organisation authorised by it should provide the predictions.

For Secondary Ports, the appropriate Hydrographic Office, or an organisation authorised by it should, where possible, provide the predictions. Should such predictions not be available, the ECDIS manufacturer should approach the appropriate national Hydrographic Office for advice regarding the best methods of prediction for the Secondary Ports in its area of responsibility.

It is recommended that each appropriate Hydrographic Office, or an organisation authorised by it, should determine the spatial limits for applying tidal information where applicable, and the number of tidal stations to be used in modelling. Hydrographic Offices should be responsible for determining the best methodologies to be used in their areas of responsibility.

Where tidal information is encoded, it must be assessed to a minimum confidence level of 95%, irrespective of the method of application or its source.

### 10.2 Times

If it is required to show the beginning and end of the active period of tidal **features**, it must be encoded using the complex attribute **time range**. When using this attribute, the values for the sub-attributes **time end** and **time start** must be encoded as Coordinated Universal Time (UTC). The attribute definition for these sub-attributes (see clauses **XX** and **XX**) states that the mandatory format is CCYYMMDDThhmmss, where T is the separator, and this format must be used.

### 10.3 Tidal stream – flood/ebb

**IHO Definition:** **TIDAL STREAMS.** A tidal stream (or tidal current) is a horizontal movement of water associated with the rise and fall of the tide caused by tide-producing forces. (Adapted from IHO Dictionary – S-32).

Approximate tidal stream rates may be given as discrete rate values for flood and ebb flow during springs. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.173, November 2000).

**S-101 Geo Feature:** Tide stream – flood/ebb (TS\_FEB)

**Primitives:** Point, Surface

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of tidal stream	(CAT_TS)	1 : flood stream 2 : ebb stream 3 : other tidal flow	EN	1,1
Current velocity			C	1,1
Velocity maximum	(CURVEL)	velocity maximum < velocity minimum	(S) RE	1,1
Velocity minimum		velocity minimum > velocity maximum	(S) RE	0,1
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Orientation	(ORIENT)		RE	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference			(S) TE	1,1
Language	(TXTDSC)	ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1

Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: H 40, 41

#### 10.3.1 Tidal stream (flood/ebb) (see S-4 – B-407 and B-407.4)

The term “tidal streams” (French: “courants de mare”, US usage: “tidal currents”), is used to designate the periodical horizontal movements of the water, which are astronomical in origin. These are distinguished from “currents” (French: “courants généraux”), which are not dependent on astronomical conditions. In practice the navigator experiences a combination of tidal stream and current. Tidal streams are defined by the direction towards which they flow. The terms “flood stream” and “ebb stream” are used for designating the horizontal movement of the water when the tide is respectively rising or falling. To avoid any ambiguity, in the case of streams which do not turn at about the time of local high or low water, an indication must be given of the direction towards which the stream flows.

Where data are inadequate for tabulated information (**Tide Stream Panel Data** – see clause X.X), or where otherwise required, single observations comprising flood and ebb directions and/or rates, preferably corresponding to maximum rates at the spring tide, should be encoded.

If it is required to encode tidal stream information that is limited to flood and ebb directions and/or values, it must be done using the **feature Tide Stream – Flood/Ebb**.

#### Remarks:

- Maximum rates (velocities) of tidal streams during springs, where known, must be encoded in knots using the complex attribute **current velocity**, and should be quoted to one decimal place. In rivers and estuaries where there are permanent currents caused by the flow of river water, such currents must be included in the calculation of the rate.

Distinction: **Current – non-gravitational**; tidal stream - harmonic prediction; tidal stream - non harmonic prediction; tidal stream panel data; tidal stream - time series.

## 10.4 Current – non-gravitational

<b>IHO Definition:</b> <b>CURRENT – NON-GRAVITATIONAL.</b> Currents (non-gravitational) include either singly or in combination: ocean currents (wind and/or density driven), inter-oceanic equalising currents, currents of navigable rivers, river outflow effects offshore and other non-tidal flows. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.45, November 2000).				
<b>S-101 Geo Feature:</b> Current – non-gravitational (CURENT)				
<b>Primitives:</b> Point, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
<b>S-101 Attribute</b>	<b>S-57 Acronym</b>	<b>Allowable Encoding Value</b>	<b>Type</b>	<b>Multiplicity</b>
Current velocity			C	1,1
Velocity maximum	(CURVEL)	velocity maximum < velocity minimum	(S) RE	1,1
Velocity minimum		velocity minimum > velocity maximum	(S) RE	0,1
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Orientation	(ORIENT)		RE	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1

**Comment [A63]:** MD8 – 8.Co.16

Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><b>INT 1 Reference:</b> H 42, 43</p> <p><b>10.4.1 Current data (see S-4 – B-408)</b></p> <p>The term “current(s)” in this document is used to describe water movements which are generally constant in direction, and are not dependent on astronomical conditions (i.e. are non-gravitational). A current is described by the direction towards which it is running. For tidal streams, see clauses X.X and X.X.</p> <p>Currents occur as:</p> <ul style="list-style-type: none"> <li>• The flow of river water in rivers and estuaries;</li> <li>• Permanent flows in other restricted waters e.g. İstanbul Boğazı (Bosporus);</li> <li>• Permanent or seasonal oceanic currents;</li> <li>• Temporary wind-induced currents.</li> </ul> <p>Only surface currents should be encoded. It is particularly important to depict currents (both the main flows and permanent eddies) which could set a vessel towards dangers.</p> <p>If it is required to encode a non-gravitational current, it must be done using the feature <b>Current – Non-gravitational</b>.</p> <p><b>Remarks:</b></p> <ul style="list-style-type: none"> <li>• Maximum rates (velocities) of currents, where known, must be encoded in knots using the complex attribute <b>current velocity</b>, and should be quoted to one decimal place. Ideally, the minimum and maximum strengths should be quoted, where known, if the strength varies.</li> <li>• In tidal waters where the flow of river water alternately reinforces the ebb tidal stream and reduces the flood, the combined effect must be encoded, where required, for the convenience of the navigator, i.e. the combined current must be encoded using the features <b>Tide Stream – Flood/Ebb</b> or <b>Tide Stream Panel Data</b> (see clauses X.X and X.X). In restricted waters where tides are negligible, the direction and/or rate of flow should be encoded using <b>Current – Non-gravitational</b>.</li> <li>• Ocean currents are permanent or seasonal, are somewhat variable in strength and direction, and generally cover broad areas. Where required, this information must be encoded using <b>Current – Non-gravitational</b>. In cases where the current strength and direction are subject to seasonal variations, this should be indicated using the complex attribute <b>date range</b>, with sub-attribute <b>periodic = True</b>. This may require multiple <b>Current – Non-gravitational</b> features with attributes populated in accordance with the seasonal variations to be coincident in the ENC. Where the direction of an ocean current is so variable that it is not practicable to show this information, the attribute <b>orientation</b> must be populated with an empty (null) value. This may generally occur when the <b>Current – Non-gravitational</b> is encoded as type <b>surface</b>.</li> <li>• Local weather conditions can produce significant temporary wind-induced currents which cannot be charted. If there is a known hazard, e.g. if winds from a particular direction have been found to endanger vessels by setting them on to shoals unexpectedly, a cautionary note may be added using the feature <b>Caution Area</b> (see clause X.X). If considered necessary, the note may refer to further information in other publications, such as Sailing Directions.</li> </ul> <p><b>Distinction:</b> <b>Tidal stream (flood/ebb)</b>; tidal stream - harmonic prediction; tidal stream - non harmonic prediction; tidal stream panel data; tidal stream - time series.</p>				

## 10.5 Water turbulence

<b>IHO Definition:</b> <b>WATER TURBULENCE.</b> The disturbance of water caused by the interaction of any combination of waves, currents, tidal streams, wind, shoal patches and obstructions. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.198, November 2000).				
<b>S-101 Geo Feature:</b> Water turbulence (WATTUR)				
<b>Primitives:</b> Point, Curve, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of water turbulence	(CATWAT)	1 : breakers 2 : eddies 3 : overfalls 4 : tide rips 5 : bombora	EN	1,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<b>INT 1 Reference:</b> H 44, 45; K 17 <b>10.5.1 Overfalls, races, breakers, eddies (see S-4 – B-423)</b> If it is required to encode a disturbance of water, it must be done using the <b>feature Water Turbulence</b> . <b>Remarks:</b> • If it is required to encode a breaker over an off-lying shoal, it must be done using a <b>Water Turbulence feature</b> at the same position as the <b>feature</b> causing the breaker (e.g. <b>Underwater/Awash Rock</b> ).				



- A **Water Turbulence** feature of type **surface** must be covered by **Depth Area** or **Unsurveyed Area** features as appropriate.

Distinction:

## 10.6 Tidal stream – harmonic prediction

**IHO Definition: TIDAL STREAM – HARMONIC PREDICTION.** A tidal stream (or tidal current) is an alternating horizontal movement of water associated with the rise and fall of the tide caused by tide-producing forces. (IHO Dictionary – S-32).

Predicted tidal stream rates may be calculated using parameters (harmonic constituents) and an appropriate harmonic calculation algorithm. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.174, November 2000).

**S-101 Geo Feature:** Tidal stream – harmonic prediction (TS\_PRH)

**Primitives:** Point, Surface

Real World	Paper Chart Symbol	ECDIS Symbol		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Status	(STATUS)	1 : permanent 2 : occasional 5 : periodic/intermittent 7 : temporary 18 : existence doubtful	EN	0,*
Tide – method of tidal prediction	(T_MTOD)	1 : simplified harmonic method of tidal prediction 2 : full harmonic method of tidal prediction	EN	1,1
Tide – value of harmonic constituents	(T_VAHC)		TE	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: H 40-41

**10.6.1 Prediction by harmonic methods (see S-4 – B-407.4 and B-408.2)**

If it is required to encode parameters for the prediction of tidal streams using harmonic methods, it must be done using the **feature Tidal Stream – Harmonic Prediction**. The supplier of parameters should be consulted on how to use this data, and which calculation algorithms to use with the data.

Remarks:

- No remarks.

Distinction: Current – non-gravitational; **tidal stream (flood/ebb)**; tidal stream – non-harmonic prediction; tidal stream panel data; tidal stream - time series.

## 10.7 Tidal stream – non-harmonic prediction

**IHO Definition: TIDAL STREAM – NON-HARMONIC PREDICTION.** A tidal stream (or tidal current) is an alternating horizontal movement of water associated with the rise and fall of the tide caused by tide-producing forces. (IHO Dictionary – S-32).

Predicted tidal stream rates may be calculated using time and rate differences with respect to a reference station (and associated tidal stream predictions). (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.175, November 2000).

**S-101 Geo Feature: Tidal stream – non-harmonic prediction (TS\_PNH)**

**Primitives:** Point, Surface

Real World		Paper Chart Symbol	ECDIS Symbol		
S-101 Attribute		S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Feature name				C	0,*
Category of name			1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language			ISO 639-3	(S) TE	0,1
Name		(OBJNAM)		(S) TE	1,1
Status		(STATUS)	1 : permanent 2 : occasional 5 : periodic/intermittent 7 : temporary 18 : existence doubtful	EN	0,*
Tide – method of tidal prediction		(T_MTOD)	3 : time and height difference non-harmonic method	EN	1,1
Tide – time and height differences		(T_THDF)		TE	1,1
Information				C	0,*
Language			ISO 639-3	(S) TE	0,1
Text		(INFORM)		(S) TE	1,1
Textual description				C	0,*
File reference		(TXTDSC)		(S) TE	1,1
Language			ISO 639-3	(S) TE	0,1
Scale minimum		(SCAMIN)		IN	0,1
Recording date		(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication		(RECIND)		TE	0,1
Source indication				C	0,*
Authority				(S) TE	1,1
Nationality				(S) TE	1,1
ID code				(S) TE	0,1
Source				(S) TE	0,1
Source date		(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: H 40-41

**10.7.1 Prediction by non-harmonic methods (see S-4 – B-407.4 and B-408.2)**

If it is required to encode parameters for the prediction of tidal streams using time and rate, it must be done using the **feature Tidal Stream – Non-harmonic Prediction**.

The reference station to be used for these predictions must be identified using a **collection feature (C\_ASSO)** between the stream parameter **feature Tidal Stream – Time Series** or **Tidal Stream – Harmonic Prediction** of the reference station, and the stream parameter **feature Tidal Stream – Non-harmonic Prediction** of the secondary station. If the reference station is not located within the dataset or exchange set, then its tidal stream parameters should be supplied as a **geo feature** with no geometry.

Other non-harmonic methods for predicting tidal stream are not currently supported.

Remarks:

- The **feature Tidal Stream – Non-harmonic Prediction** encodes information for use when predicting times and rates for tidal streams by non-harmonic methods. The supplier of any parameters must be consulted on how to use this data, and which calculation algorithms to use with the data.

Distinction: Current – non-gravitational; **tidal stream (flood/ebb)**; tidal stream - harmonic prediction; tidal stream panel data; tidal stream - time series.

## 10.8 Tidal stream panel data

**IHO Definition: TIDAL STREAM PANEL DATA.** A tidal stream (or tidal current) is an alternating horizontal movement of water associated with the rise and fall of the tide caused by tide-producing forces. (IHO Dictionary – S-32).

Approximate tidal stream rates may be given as discrete rate values at a specified interval before or after a high water. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.176, November 2000).

### **S-101 Geo Feature:** Tide stream panel data (TS\_PAD)

**Primitives:** Point, Surface

Real World		Paper Chart Symbol	ECDIS Symbol		
S-101 Attribute		S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Feature name				C	0,*
Category of name			1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language			ISO 639-3	(S) TE	0,1
Name		(OBJNAM)		(S) TE	1,1
Tidal stream – reference station data				C	1,1
Observation depth				(S) RE	0,1
Reference tide			1 : high water 2 : low water	(S) EN	1,1
Reference tide type			1 : springs 2 : neaps 3 : mean	(S) EN	1,1
Station name				(S) TE	1,1
Station number				(S) IN	0,1
Tidal stream values				C	1,* (ordered)
Current velocity				(S) RE	1,1
Orientation				(S) RE	1,1
Time relative to tide				(S) IN	1,1
Information				C	0,*
Language			ISO 639-3	(S) TE	0,1
Text		(INFORM)		(S) TE	1,1
Textual description				C	0,*
File reference		(TXTDSC)		(S) TE	1,1
Language			ISO 639-3	(S) TE	0,1
Scale minimum		(SCAMIN)		IN	0,1
Recording date		(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication		(RECIND)		TE	0,1
Source indication				C	0,*

Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><b>INT 1 Reference:</b> H 31,46</p> <p><b>10.8.1 Tidal stream panels (see S-4 – B-407 and B-407.2-3)</b></p> <p>The term “tidal streams” (French: “courants de mare”, US usage: “tidal currents”), is used to designate the periodical horizontal movements of the water, which are astronomical in origin. These are distinguished from “currents” (French: “courants généraux”), which are not dependent on astronomical conditions. In practice the navigator experiences a combination of tidal stream and current. Tidal streams are defined by the direction towards which they flow. The terms “flood stream” and “ebb stream” are used for designating the horizontal movement of the water when the tide is respectively rising or falling. To avoid any ambiguity, in the case of streams which do not turn at about the time of local high or low water, an indication must be given of the direction towards which the stream flows.</p> <p>If it is required to encode the information generally shown on paper charts as a tidal stream panel and stations, it must be done using the <b>feature Tide Stream Panel Data</b>.</p> <p>Tidal stream values encoded in this way should be mean spring rates, i.e. the tidal stream rates associated with a tidal range which is defined as the difference in height between MHWS and MLWS.</p> <p><b>Remarks:</b></p> <ul style="list-style-type: none"> <li>The mandatory complex attributes <b>tidal stream – reference station data</b> and <b>tidal stream values</b> are structured such that the equivalent of a paper chart tidal stream panel can be reproduced in an ECDIS Pick Report display.</li> </ul> <p><b>Distinction:</b> Current – non-gravitational; <b>tidal stream (flood/ebb)</b>; tidal stream - harmonic prediction; tidal stream – non-harmonic prediction; tidal stream - time series.</p>				

## 10.9 Tidal stream – time series

IHO Definition: **TIDAL STREAM – TIME SERIES**. A tidal stream (or tidal current) is an alternating horizontal movement of water associated with the rise and fall of the tide caused by tide-producing forces. (IHO Dictionary – S-32).

Tidal stream rates over time may be approximated by a series of rate values given at regular time intervals, starting from a specified moment in time. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.177, November 2000).

### **S-101 Geo Feature:** Tidal stream – time series (TS\_TIS)

**Primitives:** Point, Surface

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Status	(STATUS)	1 : permanent 2 : occasional 5 : periodic/intermittent 7 : temporary 18 : existence doubtful	EN	0,*
Tidal stream, current – time series values	(TS_TSV)		TE	1,1
Tide, current – time interval of values	(T_TINT)		IN	1,1
Time range			C	1,1
Time end	(TIMEND)		(S) TI	1,1
Time start	(TIMSTA)		(S) TI	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1



Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><u>INT 1 Reference:</u> H 40-41</p> <p><b>10.9.1 Tidal stream time series</b> (see S-4 – B-407.4 and B-408.2)</p> <p>If it is required to encode time series data for tidal streams, it must be done using the <b>feature Tidal Stream – Time Series</b>.</p> <p><u>Remarks:</u></p> <ul style="list-style-type: none"> <li>The mandatory complex attribute <b>time range</b> is used to specify the period for which the time series is valid.</li> </ul> <p><u>Distinction:</u> Current – non-gravitational; tidal stream (flood/ebb); tidal stream - harmonic prediction; tidal stream – non-harmonic prediction; tidal stream panel data.</p>				

## 10.10 Tide – harmonic prediction

**IHO Definition: TIDE – HARMONIC PREDICTION.** Tide - the periodic rise and fall of the surface of the sea, due principally to the gravitational interaction between moon, sun and earth. (Adapted from IHO Dictionary – S-32).

Predicted tidal heights may be calculated using parameters (harmonic constituents) and an appropriate harmonic calculation algorithm. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.178, November 2000).

**S-101 Geo Feature: Tide – harmonic prediction (T\_HMON)**

**Primitives:** Point, Surface

Real World	Paper Chart Symbol	ECDIS Symbol		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Status	(STATUS)	5 : periodic/intermittent	EN	0,*
Tide – accuracy of water level	(T_ACWL)	1 : better than 0.1 m and 10 minutes 2 : worse than 0.1 m and 10 minutes	EN	0,1
Tide – method of tidal prediction	(T_MTOB)	1 : simplified harmonic method of tidal prediction 2 : full harmonic method of tidal prediction	EN	1,1
Tide – value of harmonic constituents	(T_VAHC)		TE	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1

Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><u>INT 1 Reference:</u></p> <p><b>10.10.1 Prediction by harmonic methods</b></p> <p>If it is required to encode the parameters for the prediction of tidal heights using harmonic methods, it must be done using the <b>feature Tide – Harmonic Prediction</b>. The supplier of parameters should be consulted on how to use this data, and which calculation algorithms to use with the data.</p> <p><u>Remarks:</u></p> <ul style="list-style-type: none"><li>• No remarks.</li></ul> <p><u>Distinction:</u> Tide – non-harmonic prediction; tide – time series.</p>				

### 10.11 Tide – non-harmonic prediction

IHO Definition: **TIDE – NON-HARMONIC PREDICTION**. Tide - the periodic rise and fall of the surface of the sea, due principally to the gravitational interaction between moon, sun and earth. (Adapted from IHO Dictionary – S-32).

Predicted tidal heights may be calculated using time and height differences with respect to a reference port (and associated tidal predictions). (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.179, November 2000).

#### **S-101 Geo Feature:** Tide – non-harmonic prediction (T\_NHMN)

**Primitives:** Point, Surface

Real World	Paper Chart Symbol	ECDIS Symbol		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Status	(STATUS)	5 : periodic/intermittent	EN	0,*
Tide – accuracy of water level	(T_ACWL)	1 : better than 0.1 m and 10 minutes 2 : worse than 0.1 m and 10 minutes	EN	0,1
Tide – method of tidal prediction	(T_MTOD)	3 : time and height difference non-harmonic method	EN	1,1
Tide – time and height differences	(T_THDF)		TE	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference:**10.11.1 Prediction by non-harmonic methods**

If it is required to encode parameters for the prediction of tidal heights using time and height differences, it must be done using the **feature Tide – Non-harmonic Prediction**.

The reference port to be used for these predictions must be identified using a **collection feature (C\_ASSO)** between the tidal parameter feature **Tide – Time Series** or **Tide – Harmonic Prediction** of the reference port, and the tidal parameter **feature Tide – Non-harmonic Prediction** of the secondary port. If the reference port is not located within the dataset or exchange set, then its tidal parameters should be supplied a geo **feature** with no geometry.

Other non-harmonic methods for predicting tidal stream are not currently supported.

Remarks:

- The feature "tide - non-harmonic prediction" encodes information for use when predicting times and heights for high and low waters by non-harmonic methods. The supplier of any parameters must be consulted on how to use this data, and which calculation algorithms to use with the data.

Distinction: Tide – harmonic prediction; tide – time series.

## 10.12 Tide – time series

**IHO Definition: TIDE – TIME SERIES.** Tide - the periodic rise and fall of the surface of the sea, due principally to the gravitational interaction between moon, sun and earth. (Adapted from IHO Dictionary – S-32).

Tidal heights over time may be approximated by a series of height values given at regular time intervals, starting from a specified moment in time. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.180, November 2000).

**S-101 Geo Feature:** Tide – time series (T\_TIMS)

**Primitives:** Point, Surface

Real World		Paper Chart Symbol	ECDIS Symbol		
S-101 Attribute		S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Feature name				C	0,*
Category of name			1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language			ISO 639-3	(S) TE	0,1
Name		(OBJNAM)		(S) TE	1,1
Status		(STATUS)	5 : periodic/intermittent	EN	0,*
Tide – accuracy of water level		(T_ACWL)	1 : better than 0.1 m and 10 minutes 2 : worse than 0.1 m and 10 minutes	EN	0,1
Tide, current – time interval of values		(T_TINT)		IN	0,1
Tide – high and low water values		(T_HWLW)		TE	1,1
Tide – time series values		(T_TSVL)		TE	0,1
Time range				C	1,1
Time end		(TIMEND)		(S) TI	1,1
Time start		(TIMSTA)		(S) TI	1,1
Information				C	0,*
Language			ISO 639-3	(S) TE	0,1
Text		(INFORM)		(S) TE	1,1
Textual description				C	0,*
File reference		(TXTDSC)		(S) TE	1,1
Language			ISO 639-3	(S) TE	0,1
Scale minimum		(SCAMIN)		IN	0,1
Recording date		(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication		(RECIND)		TE	0,1
Source indication				C	0,*
Authority				(S) TE	1,1
Nationality				(S) TE	1,1

ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><u>INT 1 Reference:</u></p> <p><b>10.12.1 Time series data</b></p> <p>If it is required to encode times and heights of high and low waters, it must be done using the <b>feature Tide – Time Series</b>. In addition, where the data is available, a regular time series of tidal heights should also be encoded using this <b>feature</b>.</p> <p><u>Remarks:</u></p> <ul style="list-style-type: none"> <li>The mandatory complex attribute <b>time range</b> is used to specify the period for which the time series is valid.</li> </ul> <p><u>Distinction:</u> Tide – harmonic prediction; tide – non-harmonic prediction.</p>				

## 11 Depths

### 11.1 Generalisation of depth portrayal

When a survey or chart is reduced in scale the generalization that is required has several effects:

- a. Deeper soundings tend to be eliminated while the shoaler ones are retained for safety. Sufficient numbers of deeper soundings should be retained to show the full range of depth. This is to assist the navigator who uses their echo sounder to help verify their position, or the mariner choosing an anchorage of suitable depth.
- b. Generalization proceeds by the inclusion of shoals lying to seaward of the principal contour, and by the smoothing of severely indented contours, with the effect of pushing the contours seaward. However, as a shoal which rises steeply from deep water is much more of a hazard than one which rises gradually, the encoder must ensure that the contours are not pushed seaward unduly. If the encoder gives the impression that a mariner will get warning of too close an approach to the danger, by relying on their echo sounder to show gradually shoaling depth - when the danger is, in fact "steep-to" - they may seriously mislead and endanger the ENC user.
- c. With the "expansion" of shoals, described above, it may become increasingly difficult to find space on an ENC dataset to show the line of deepest soundings through a channel, or even to show a channel at all. Yet even at small maximum display scale **s** it is important to show the usable channels and indicate their least depth. The encoder may have to make greater use of depth contours than soundings in depicting narrow channels.
- d. Even such dangers as drying rocks and islets require generalization in coastal areas. This is in recognition of the principle that, whereas they are particularly dangerous in isolation and must then be shown as precisely as possible, where they occur in groups a representative depiction is permissible, showing the outermost features as individually as space permits.

### 11.2 Representation of depth: General

Some of the principles of depth depiction are summarized below:

- a. The least depth over shoals and banks, and over sills (bars) in navigable channels, must be shown. Particular attention should also be paid to full and accurate representation of all other "critical" areas, e.g. on and adjacent to leading lines, controlling depths in fairways and along recommended tracks, in anchorages, alongside jetties, quays and berths and in the entrances to harbours and basins. Maximum as well as minimum depth should be shown where possible, e.g. to show the line of deepest water in narrow channels. However, deeper soundings on the sloping side of a bank near to the crest line should not be selected if they could give the impression that there is a deeper passage across the crest between shoaler soundings.
- b. Soundings and contours must be used to complement each other in giving a reasonable representation of the seabed, including all significant breaks of slope.
- c. The density of soundings should be determined by the type of seabed. Flat or evenly sloping areas, and banks of unconsolidated sediment, should have a minimum of soundings, fairly evenly spaced, but gradually becoming more widely spaced as the depth increases. Irregular bottom topography should be represented by a denser, and probably irregular, pattern of soundings. A steep gradient should be represented by close contours, undistorted by soundings.
- d. In changeable areas, where surveys of different dates adjoin and do not match exactly, gaps in the contours may be left to indicate the discontinuity of depth to the navigator.
- e. Where practicable, soundings on smaller maximum display scale **ENCs** should be selected from those shown on the larger maximum display scale **ENCs**.
- f. In areas navigable only at high water, drying heights must be selected according to the same principles as soundings.
- g. Where surveys are inadequate, it may be advisable to omit some of the standard contour lines.



### 11.3 Sounding

<b>IHO Definition:</b> <b>SOUNDING.</b> A measured water depth or spot which has been reduced to a vertical datum (may be a drying height). (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.163, November 2000).				
<b>S-101 Geo Feature: Sounding (SOUNDG)</b>				
<b>Primitives:</b> Point				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Exposition of sounding	(EXPSOU)	1 : within the range of depth of the surrounding depth area 2 : shoaler than the range of depth of the surrounding depth area 3 : deeper than the range of depth of the surrounding depth area	EN	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Quality of sounding measurement	(QUASOU)	1 : depth known 3 : doubtful sounding 4 : unreliable sounding 5 : no bottom found at value shown 8 : value reported (not surveyed) 9 : value reported (not confirmed)	EN	0,*
Sounding uncertainty	(SOUACC)		RE	0,1
Status	(STATUS)	18 : existence doubtful	EN	0,*
Technique of sounding measurement	(TECSOU)	1 : found by echo-sounder 2 : found by side scan sonar 3 : found by multi-beam 4 : found by diver 5 : found by lead-line 6 : swept by wire-drag 7 : found by LIDAR 8 : swept by vertical acoustic system 9 : found by electromagnetic sensor 10 : photogrammetry 11 : satellite imagery 12 : found by levelling 13 : swept by side-scan sonar 14 : computer generated Xx : synthetic aperture	EN	0,*

		radar Xx : hyperspectral Xx : etc?		
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

**INT 1 Reference:** I 10, 12-15

### 11.3.1 Soundings (see S-4 – B-412 and B-413.1)

A sounding associated with a rock or coral pinnacle which is an obstruction to navigation must be encoded using the **feature Underwater/Awash Rock** (INT1 – K14, **see clause X.X**) with attribute **value of sounding** populated with the value of the sounding.

The geometry of soundings is held in a 3 dimensional array (latitude, longitude, depth). In the interests of efficiency, multiple soundings should be encoded in one **spatial type**, provided that all the spatial and geo **feature** attributes are common to the group.

As the sounding multiplication factor (**CMFZ**) for ENC is **100**, soundings **may** be encoded to **two** decimal places of a metre. Drying soundings must be indicated by a negative value.

For soundings surrounded by a danger line, see clause **X.X**.

Population of the attributes **quality of sounding measurement**, **source date** and the **spatial attribute quality of position** are described in the Table below:

Sounding	S-4	INT 1	quality of position	quality of sounding measurement	Remarks
In true position	B-412.1	I10		1or <undefined>	May be encoded using <b>quality of position = 10</b>
Out of position on paper chart	B-412.2	I11 I12		1or <undefined>	<b>Spatial type</b> must be encoded at the true position. There is no "sounding, out of position" in an ENC.
No bottom found	B-412.3	I13		5	For "no bottom found" soundings, where the value of the sounding is less than the depth of the surrounding depth area, the value <b>exposition of sounding = 2</b> (shoaler than the depth of the surrounding depth area) should be populated.

Lower reliability	B-412.4	I14	4	4	
Drying	B-413	I15		1or <undefined>	Negative value
Doubtful	B-424.4	I2		3	Existence doubtful should be encoded using <b>status = 18</b>
Reported but not confirmed		I3 I4	8	9	If available, the year of report must be encoded using the attribute <b>source date</b>

Remarks:

- The attribute **exposition of sounding** indicates objects with a "value of sounding" within or not within the range of depth of the surrounding area . Encoders are advised to use caution when considering the population of **exposition of sounding = 2** (shoaler than the range of depth of the surrounding depth area) for **Sounding** features, as **Sounding** features will not be displayed when utilising some ECDIS display settings. Where it is considered that a sounding that is shoaler than the range of depth of the surrounding depth area may be a hazard to navigation, encoders should preferably conduct further investigation of source material in order to encode additional depth contour and depth area information more relevant to the sounding. Alternatively, encoders may consider using an alternate feature (e.g. **Obstruction**) to encode the depth.
- The attribute **technique of sounding measurement** must only be populated for **Sounding** features to indicate lower reliability soundings than indicated by the underlying meta feature **Quality of Bathymetric Data** (see clauses X.X and X.X)
- Where **Sounding** features are covered by the meta feature **Quality of Survey** (see clause X.X), the attribute **quality of sounding measurement** must not be populated unless different to the value of **quality of sounding measurement** populated for the **Quality of Survey**.

Distinction: Depth area; obstruction; underwater/awash rock; wreck.

## 11.4 Dredged area

<b>IHO Definition:</b> <b>DREDGED AREA.</b> An area of the bottom of a body of water which has been deepened by dredging. (IHO Dictionary – S-32).				
<b>S-101 Geo Feature:</b> Dredged area (DRGARE)				
<b>Primitives:</b> Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Depth range <b>minimum</b> value	(DRVAL1)		RE	1,1
Depth range <b>maximum</b> value	(DRVAL2)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Quality of sounding measurement	(QUASOU)	10 : maintained depth 11 : not regularly maintained	EN	0,*
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 7 : entry prohibited 8 : entry restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transshipment (lightening) prohibited 25 : stopping prohibited 27 : speed restricted 28 : swimming prohibited	EN	0,*
Sounding <b>uncertainty</b>	(SOUACC)		RE	0,1
Technique of sounding measurement	(TECSOU)	1 : found by echo-sounder 2 : found by side scan sonar 3 : found by multi-beam	EN	0,*

**Comment [j64]:** S-57  
Extension 06/01.

		6 : swept by wire-drag 7 : found by LIDAR 8 : swept by vertical acoustic system 9 : found by electromagnetic sensor 11 : satellite imagery 13 : swept by side-scan sonar		
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: I 20-23

#### 11.4.1 Dredged areas (see S-4 – B-414)

If it is required to encode dredged areas, this must be done using the **feature Dredged Area**.

##### Remarks:

- The attribute **depth range minimum value** must be used to encode the dredged depth for the dredged area. Where required, the attribute **depth range maximum depth** must be used to encode the deeper depth where a range of depths for the dredged area is indicated on the source.
- The boundary of a dredged area should not have coincident **curve geo features** encoded, unless part of the boundary corresponds to the shoreline (see clause X.X).
- Dredged areas are often subject to siltation, resulting in shoaler depths being identified in the dredged area than the designed dredged depth. Where a **Sounding feature** is encoded in a dredged area to indicate shoaler depths, the attribute value **exposition of sounding = 2** (shoaler than the depth of the surrounding depth area) should not be populated (see clause 5.3). Where required, the shoal depths should be encoded using **Sounding**, with the appropriate underlying depth information (**Depth Area** and, if required, **Depth Contour**) to support the depths. Alternatively, the attribute **depth range maximum value** for the **Dredged Area** may be set to the designed dredged depth for the dredged area, and the attribute **depth range minimum value** set to the value of the shoalest depth, or a **Caution Area feature** may be encoded covering the shoaler depth area with the depth information provided using the **complex** attribute **information**. Where the shoal depths are close to the edge of the dredged area, the dredged area limit may be adjusted to exclude the shoal depths from the **surface**. See also S-4 – B-414.5.
- The attribute **source date** may be used to encode the year of the latest control survey for dredged areas where the dredged depth is not maintained. For dredged areas where the dredged depth is maintained, it is not required to indicate the year of dredging.
- Where the attribute **sounding uncertainty** is populated for a **Dredged Area feature**, it must not be equivalent to or degrade the accuracy indicated by the attributes **category of zone of confidence in data** or **sounding uncertainty for the underlying Quality of Bathymetric Data meta feature** (see clause X.X).
- **Dredged Area features** are part of **Group 1**.

Distinction: Depth area; dumping ground; swept area.

Comment [j65]: S-58 tests 1533 and 1649.

## 11.5 Swept area

**IHO Definition:** **SWEPT AREA.** An area that has been determined to be clear of navigational dangers to a specified depth. (Adapted from **IHO Dictionary – S-32**).

### **S-101 Geo Feature:** Swept area (SWPARE)

**Primitives:** Surface

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Depth range <b>minimum value</b>	(DRVAL1)		RE	1,1
Quality of sounding measurement	(QUASOU)	1 : depth known 6 : least depth known	EN	0,*
Sounding <b>uncertainty</b>	(SOUACC)		RE	0,1
Technique of sounding measurement	(TECSOU)	6 : swept by wire-drag 8 : swept by vertical acoustic system 13 : swept by side-scan sonar	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

**INT 1 Reference:** I 24

#### 11.5.1 Swept areas (see S-4 – B-415)

If it is required to encode a swept area, it must be done using the **feature Swept Area**.

Spot soundings and depth contours shown in these areas must be encoded using **Sounding** and **Depth Contour features**. Attributes **quality of sounding measurement**, **sounding uncertainty** and **technique of sounding measurement** encoded on **Swept Area** apply to the swept area only. When it is required to encode the quality of spot soundings and depth contours, it must be done using the meta **feature Quality of Bathymetric Data** (see clause **X.X**).

Even if the area contains no spot soundings or depth contours, a **Swept Area feature** must overlap **Depth Area** or **Dredged Area features**. If there is insufficient depth information to allow the attributes **depth range minimum value** and **depth range maximum value** to be encoded on a **Depth Area** or **Dredged Area**

**feature**, **depth range minimum value** should be set to the swept depth and **depth range maximum value** should be set to an empty (null) value.

Remarks:

- The attribute **depth range minimum value** must be used to encode the swept depth for the swept area.
- When a swept area occupies an entire **Quality of Bathymetric Data surface feature** and a **Swept Area feature** is not defined separately, **depth range minimum value** for the **Quality of Bathymetric Data feature** must be used to encode the swept depth. The attribute **sounding uncertainty** may be used on the **Quality of Bathymetric Data feature** to specify the accuracy of the swept depth defined by **depth range minimum value** - the attribute **positional uncertainty** must not be used. There must be no depth or positional accuracy information provided for any underlying soundings within the swept area.
- When a swept area occupies an entire **Quality of Bathymetric Data surface feature** and a **Swept Area feature** is defined separately, the **depth range minimum value** value encoded on the **Quality of Bathymetric Data feature** must be the same as the **depth range minimum value** value encoded on the **Swept Area feature**. **sounding uncertainty** may be used on the **Quality of Bathymetric Data feature** to specify the accuracy of the swept depth - **positional uncertainty** must not be used. There must be no depth or positional accuracy information provided for any underlying soundings within the swept area.
- When a **Swept Area feature** exists within a **Quality of Bathymetric Data feature**, **sounding uncertainty** must only be used on the **Quality of Bathymetric Data feature** if the same depth accuracy applies to the swept depth and to the soundings outside the swept area. **positional uncertainty** must only be used to encode the accuracy of depths falling outside the boundaries of the swept area. There must be no depth or positional accuracy information provided for any underlying soundings within the swept area.
- Where required, the date of sweeping must be populated using the attribute **source date**.
- **Swept Area** features must not overlap.

Comment [j66]: S-58 test 1782.

Distinction: Depth area; dredged area; unsurveyed area.

## 11.6 Depth contour

**IHO Definition: DEPTH CONTOUR.** A line connecting points of equal water depth which is sometimes significantly displaced outside of soundings, symbols and other chart detail for clarity as well as generalization. Depth contours, therefore, often represent an approximate location of the line of equal depth as related to the surveyed line delineated on the source. Also referred to as depth curve. (IHO Dictionary – S-32).

### **S-101 Geo Feature: Depth contour (DEPCNT)**

**Primitives:** Curve

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Value of depth contour	(VALDCO)		RE	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

**INT 1 Reference:** I 15, 30, 31

#### **11.6.1 Depth contours (see S-4 – B-404.2; B-410; B-411 to B-411.5; B-413 and B-413.1)**

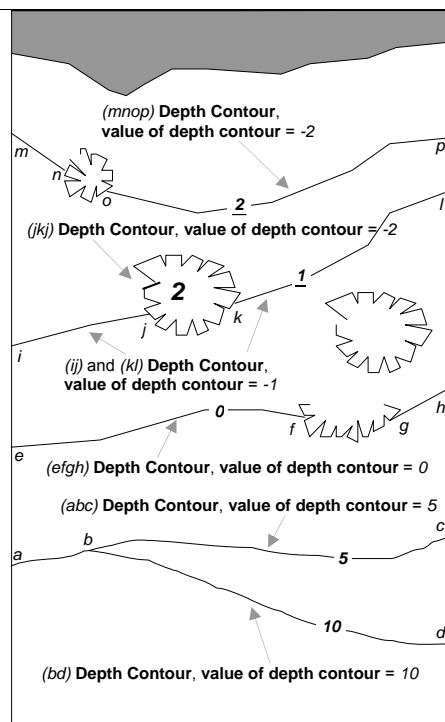
The standard series of depth contour lines to be encoded for ENC is: drying line (where tides are appreciable), 2, 5, 10, 15, 20, 30, 50, 100, 200, 300, 400, 500, 1000, 2000 metres, etc. The 2, 5 and/or 15 metre contours may be omitted where they serve no useful purpose, and on smaller maximum display scale ENC data all depth contours to 30 metres (1:1500000 and 1:3000000 maximum display scales) or 200 metres (1:10000000 maximum display scale) should be omitted. It is not necessary for the complete sequence of contours to be shown, e.g. on steep slopes and around isolated pinnacles.

Supplementary contours, e.g. at 3, 8, 25, 40, 75 metres and multiples of 10 or 100 metres may be shown, if the available data permit, to delineate particular bathymetric features where soundings would otherwise be the only depth information over a large area, or for the benefit of particular categories of shipping. The 2500 metre contour may be required for measuring Continental Shelf limits (see UNCLOS Article 76).

On the larger maximum display scale ENC datasets, e.g. datasets intended for harbour navigation or berthing; or in areas where vessel under keel clearance is critical, a smaller contour interval may be used (e.g. 1 metre) in the depth range suitable for the deepest draught vessels that may navigate in the area.

**Comment [j67]:** TSMAD20 Action.





The boundary of a drying rocky area (see INT1 - J20) or coral reef (see INT1 - J22) may be coincident with the zero metre contour (see 'fg' in Figure). If it is required to encode this boundary, it must be done using the **feature Depth Contour** with the attribute **value of depth contour = 0**.

On **the source**, the presentation of contours in areas of steep slope is sometimes generalised so that closely spaced contours are removed to leave a single contour (see 'ab' in Figure). In such cases, this contour must be encoded using the shallowest depth of the slope.

Wherever possible, contours must be closed, or connected to the border of the **dataset**, a coastline **feature** or another contour, in order to define closed areas.

Spatial **features** associated with approximate contours should be encoded using the attribute **quality of position = 4** (approximate).

#### Remarks:

- Encoded drying contours must be indicated by negative values for the attribute **value of depth contour**.

**Distinction:** Coastline; depth area; sounding.

## 11.7 Depth area

**IHO Definition: DEPTH AREA.** A water area whose depth is within a defined range of values. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.51, November 2000).

### **S-101 Geo Feature: Depth area (DEPARE)**

**Primitives:** Curve, Surface

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Depth range minimum value	(DRVAL1)		RE	1,1
Depth range maximum value	(DRVAL2)		RE	1,1
Quality of sounding measurement	(QUASOU)	1 : depth known 2 : depth or least depth unknown 3 : doubtful-sounding 4 : unreliable-sounding	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

**Comment [j68]:** MD8 – 4.Co.11 and 4.Cl.9.

#### **INT 1 Reference:**

##### **11.7.1 Depth areas (see S-4 – B-410 .....)**

The sea area, the intertidal area and the navigable parts of rivers, lakes and canals **must be** divided into depth areas, each of them having a range of depth.

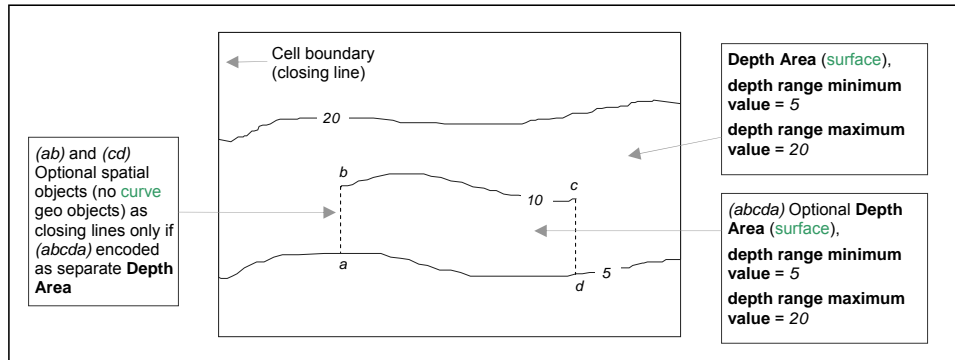
As many depth areas as possible must be created using encoded depth contours.

#### **Remarks:**

- The value of **depth range maximum value** for the deepest **Depth Area** on the ENC **dataset** should be encoded with the next deepest depth contour from the standard range of depth contours appropriate to the **maximum display scale of the ENC data (see clause X.X)**, noting that the depth ranges used for adjoining **ENC datasets** of the same or similar **maximum display scale** must also be considered.
- Depth Area features of type surface are part of Group 1.**

##### **11.7.2 Geometry of depth areas**

Where **surfaces** are not closed on the source, it may be necessary to close these **surfaces** using edges without associated **curve features**. This is mandatory at the boundary of a **dataset** (see Figure below).



Remarks:

- For short isolated sections of **Depth Contour features** such as (bc), it is up to the producing authority whether to encode the small **area** (abcd) as a separate **Depth Area feature** of type **surface**, or to encode only the **curve** (bc) as a floating **Depth Contour feature** within a single **Depth Area surface** having attributes **depth range minimum value** = 5 and **depth range maximum value** = 20.

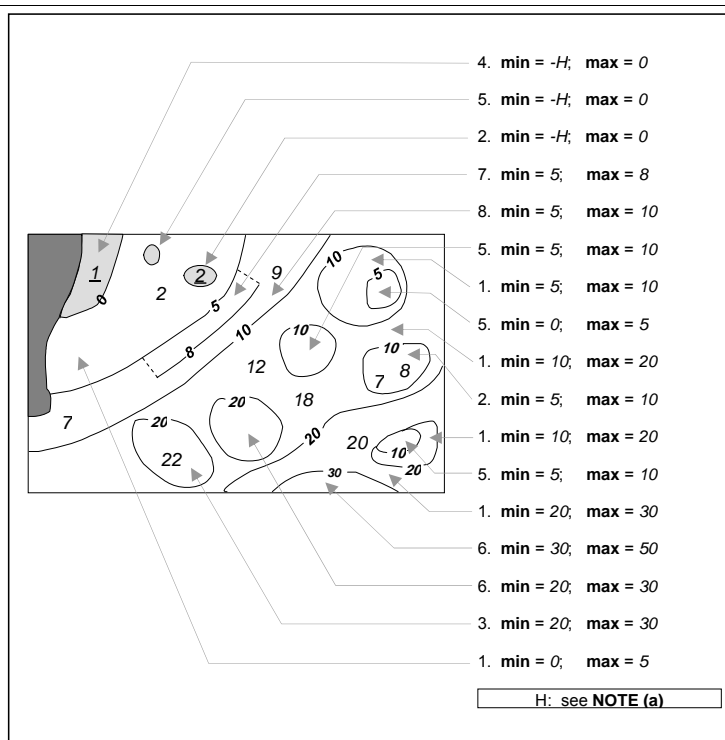
### 11.7.3 Use of attributes **depth range minimum value** and **depth range maximum value** for depth areas in general

For each depth area of type **surface**, **depth range minimum value** and **depth range maximum value** should be encoded with the values corresponding to the shallowest and deepest depths in that area. These values, except for the shallowest and deepest areas, should be chosen from the values of the depth contours encoded in the dataset.

A drying area, within which a drying height is indicated without a true position, should be encoded using a **Depth Area feature**, with **depth range minimum value** usually set to -H (see NOTE (a) associated with Figure below for definition of H) and **depth range maximum value** set to a dataset contour value (usually zero). The drying height should be encoded **using the attribute INFORM on the Depth Area feature** (e.g. **Dries 1.4**).

If a depth area is adjacent to a non-navigable waterway, a closing **curve** (i.e. no **curve geo feature**) should be encoded at the boundary between navigable and non-navigable waters. See clause **X.X**.

In the Figure below, the annotation "**min**" equates to the attribute **depth range minimum value** and the annotation "**max**" equates to the attribute **depth range maximum value**.



**NOTE (a):** H = Height of the coastline datum above sounding datum, or a rounded value (e.g. (1) the value of the highest drying contour indicated on the source document; or (2) zero, if the coastline datum is the same as the sounding datum).

In the following clauses, the paragraph numbers refer to the item numbers in the above Figure. These clauses do not cover all encoding scenarios.

1. If the depth area is bounded by two or more depth contours:
  - **depth range minimum value** should take the value of the dataset depth contour immediately shallower than the value of **depth range maximum value**.
  - **depth range maximum value** should take the value of the deepest depth contour bounding the area.
2. If the deepest depth is shown by a depth contour, and the shallowest depth is shown by a sounding (a shoal):
  - **depth range minimum value** should take the value of the dataset depth contour immediately shallower than the value of the sounding or -H.
  - **depth range maximum value** should take the value of the depth contour.
3. If the deepest depth is shown by a sounding and the shallowest depth is shown by a depth contour (a deep):
  - **depth range minimum value** should take the value of the depth contour.
  - **depth range maximum value** should take the value of the dataset depth contour immediately deeper than or equal to the value of the sounding.
4. If the shallowest depth is defined by the coastline:
  - **depth range minimum value** should take the value of -H.
  - **depth range maximum value** should take the value of the shallowest dataset depth contour bounding the area.
5. If the depth area is bounded by only one depth contour, contains no soundings, and is a shoal:
  - **depth range minimum value** should take the value of the dataset depth contour immediately shallower than the value of the depth contour, or -H.

- **depth range maximum value** should take the value of the depth contour.
6. If the depth area is bounded by only one depth contour, contains no soundings, and is a deep:
- **depth range minimum value** should take the value of the depth contour.
  - **depth range maximum value** should take the value of the dataset depth contour immediately deeper than the value of the depth contour.
7. If the depth area is bounded by an incomplete depth contour on one side (such as in incompletely surveyed area), and a complete depth contour on the other:
- This area is optional. See clause **X.X above** and **associated** Figure.
8. If the depth area is bounded by complete depth contours, but contains an incomplete (floating) depth contour:
- **depth range minimum value** should take the value of the shallowest depth contour.
  - **depth range maximum value** should take the value of the deepest depth contour.
- NOTE: This encoding is mandatory whether the optional depth area in paragraph 7 above is encoded or not.

#### 11.7.4 Rivers, canals, lakes, basins

Where these areas are navigable at **the maximum display scale for the ENC data**, they must be encoded using the Group 1 **features Depth Area, Dredged Area or Unsurveyed Area**, and coastline-type **features Coastline or Shoreline Construction**. If it is required to encode the nature and name of the area, it must be done using the **feature Sea Area/Named Water Area**.

Where these areas are required and are not navigable at **the maximum display scale for the ENC data**, they must be encoded using the **features River, Canal, Lake, Dock Area or Lock Basin**. These **features** must be covered by **Land Area or Unsurveyed Area features**.

#### 11.7.5 Areas of continual change (see S-4 – B-416)

If it is required to encode an area of continually changing depth, it must be done using the **feature Caution Area** (see clause **X.X**). Caution notes in such areas must be encoded using the **complex** attributes **information** or **textual description**.

Such areas must always overlap **Depth Area features**.

An area on the source with the indication "Less water" should be encoded using this method.

If it is required to encode sandwaves, this must be done using the **feature Sandwave** (see clause **X.X**).

Distinction: Depth contour; dredged area; obstruction; sea area/named water area; sounding; unsurveyed area; wreck.

## 11.8 Areas with inadequate depth information

IHO Definition: **UNSURVEYED AREA.** An area for which no bathymetric survey information is available. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.195, November 2000).

### **S-101 Geo Feature:** Unsurveyed area (UNSARE)

**Primitives:** Surface

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: I 25

#### 11.8.1 Unsurveyed areas (see S-4 – B-418)

Unsurveyed areas may be defined as those within which there is no available data derived from a systematic hydrographic survey. This may include areas which only have lines of passage soundings and/or other miscellaneous data such as isolated ship's reports.

Areas with little or no bathymetric survey information, and falling within a meta feature **Data Coverage** surface with attribute **category of coverage = 1** (coverage available), must be encoded using the feature **Unsurveyed Area**.

The area must also be covered by **Quality of Bathymetric Data** features (see clause X.X), with suitably defined attribute **category of zone of confidence in data value**, usually value 5 (zone of confidence D).

Remarks:

- **Unsurveyed Area** features are part of **Group 1**.

#### 11.8.2 Inadequately surveyed areas (see S-4 – B-417)

Inadequately surveyed areas may be defined as those areas where bathymetry is based on older lead line surveys or other surveys which are either open in nature (e.g. reconnaissance surveys), or are not hydrographic surveys (e.g. seismic surveys). These types of surveys are inadequate for identifying all shoals that may exist between lines of soundings, or may not be "shoal-biased" in their selection of recorded depths.

An inadequately surveyed area should be encoded using either an **Unsurveyed Area** feature, within which soundings and contours may be encoded (but not depth areas), or using **Depth Area** features. The attributes

**depth range minimum value** and **depth range maximum value** for such depth areas should have explicit values.

The area must also be covered by **Quality of Bathymetric Data features** (see clause X.X), with suitably defined attribute **category of zone of confidence in data values**, usually value 5 (zone of confidence D). Further information may be given using the meta **feature Quality of Survey**, where appropriate.

A cautionary note should also be encoded using a **Caution Area feature** of type **surface** (see clause X.X).

### 11.8.3 Bathymetry in areas of minimal depiction of detail on paper charts

Where areas of little or no depth information exist within a **specified ENC usage**, they should be encoded using one of the following options:

#### 11.8.3.1 Areas of omitted bathymetry

Encoders are advised that when encoding areas of bathymetry from paper charts containing minimal depth detail at scales that correspond to the **maximum display scale** for the data, to consult larger scale paper charts or **maximum display scale** ENC datasets and generalise the bathymetry from this data. This is done to ensure that sufficient information is encoded so as not to conflict with larger **maximum display scale** coverage. The following is the recommended minimum encoding requirement in such cases:

Where larger **maximum display scale** ENC coverage is available, the larger scale datasets should be examined to determine the shallowest **Depth Area feature**, other than the intertidal area, within the whole of the area. Intertidal areas should then be generalised from the larger **maximum display scale** coverage, and one **Depth Area feature** may then be created, with attributes **depth range minimum value** and **depth range maximum value** encoded from the values obtained from the larger scale, corresponding to the remaining area of bathymetry.

Where larger **maximum display scale** coverage does not exist, a single **Depth Area feature** may be created to cover the area of omitted bathymetry. The **depth range minimum value** of the **Depth Area feature** should be set to the shallowest value appropriate to the colour tint that is applied to it (e.g. if blue tint is used for 5-20m areas, the **depth range minimum value** for the area of omitted bathymetry should be set to 5). The **depth range maximum value** should be set to the shallowest value of the surrounding Group 1 polygons.

In either case, the areas should be covered by a **Caution Area feature**, the boundary of which follows exactly the surrounding Group 1 **features** (see clause X.X).

Encoders should consider the effect of over-generalising areas of omitted bathymetry on the ECDIS display as the mariner "zooms out" through the ENC display scales.

#### 11.8.3.2 Areas of very simplified bathymetry

In these areas, information relating to bathymetry (e.g. depth contours, dangers, rocky areas, isolated rocks, nature of the seabed, dredged areas, unsurveyed areas) should be individually encoded as normal.

A **Caution Area feature** should be created covering the **Depth Area features**, within the area of simplified bathymetry, in order to encode a cautionary note (see clause X.X).

Distinction:

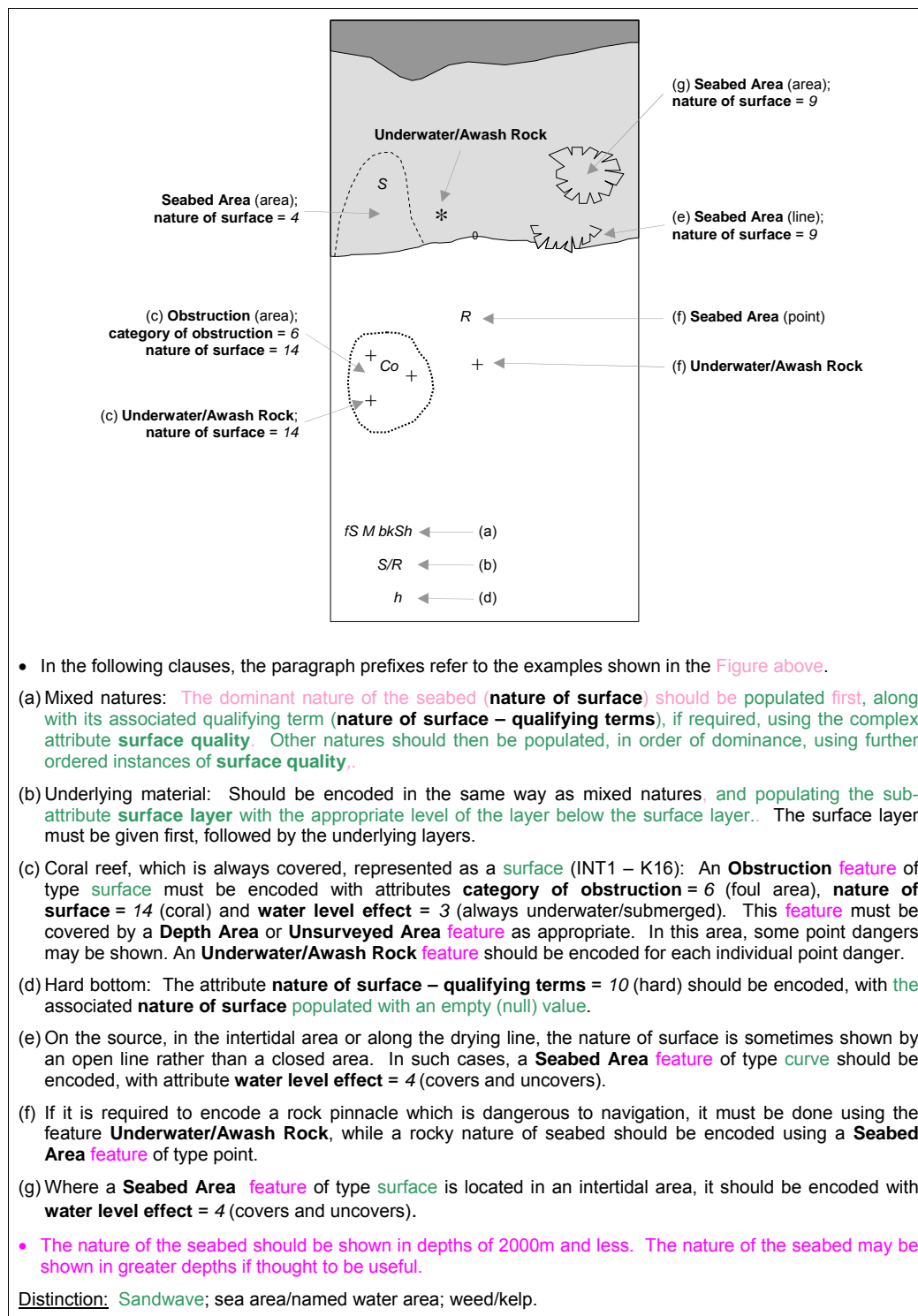
## 12 Nature of the Seabed

### 12.1 Seabed area

<p><u>IHO Definition:</u> <b>SEABED AREA.</b> An area of the sea where the nature of bottom is homogeneous. The nature of bottom includes the material of which it is composed and its physical characteristics. Also called <b>nature of bottom</b>, character (or characteristics) of the bottom, or quality of the bottom. (Adapted from IHO Dictionary – S-32).</p>				
<b>S-101 Geo Feature: Seabed area (SBDARE)</b>				
<b>Primitives:</b> Point, Curve, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
<b>S-101 Attribute</b>	<b>S-57 Acronym</b>	<b>Allowable Encoding Value</b>	<b>Type</b>	<b>Multiplicity</b>
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Surface quality			C	1,* (ordered)
Nature of surface	(NATSUR)	1 : mud 2 : clay 3 : silt 4 : sand 5 : stone 6 : gravel 7 : pebbles 8 : cobbles 9 : rock 11 : lava 14 : coral 17 : shells 18 : boulder	(S) EN	1,1
Nature of surface – qualifying terms	(NATQUA)	1 : fine 2 : medium 3 : coarse 4 : broken 5 : sticky 6 : soft	(S) EN	0,1



		7 : stiff 8 : volcanic 9 : calcareous 10 : hard		
Surface layer			(S) IN	0,1
Water level effect	(WATLEV)	3 : always under water/ submerged 4 : covers and uncovers 5 : awash	EN	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><b>INT 1 Reference:</b> J 1-12, 30-39</p> <p><b>12.1.1 Description of the bottom (see S-4 – B-425 to B-427)</b></p> <p>The nature (quality) of the seabed (bottom) must be shown in sufficient detail, where known and on the appropriate maximum display scale <b>ENC data</b>, for such purposes as:</p> <ul style="list-style-type: none"> <li>• to give some guidance on holding characteristics when anchoring;</li> <li>• to help in assessing the stability of shoals and to distinguish rocks from unconsolidated material, when navigating in shoal areas;</li> <li>• to show where vessels may safely take the ground at low water in tidal areas; or</li> <li>• to give an indication of the nature of the seabed in deeper waters for fishermen and submariners.</li> </ul> <p>If it is required to encode an area of the sea where the nature of the bottom is homogeneous, it must be done using the <b>feature Seabed Area</b>.</p> <p><b>Remarks:</b></p> <ul style="list-style-type: none"> <li>• Generally, it is not possible to define a seabed area by its real extent. For that reason, the characteristics of the seabed area may be represented at one single position.</li> </ul>				



## 12.2 Weed/kelp

**IHO Definition: WEED/KELP.** Seaweed is the general name for marine plants of the Algae class which grow in long narrow ribbons. (International Maritime Dictionary, 2<sup>nd</sup> Ed.).

Kelp is one of an order (laminariales) of usually large, blade-shaped or vine-like brown algae. (IHO Dictionary – S-32).

### **S-101 Geo Feature: Weed/kelp (WEDKLP)**

**Primitives:** Point, Surface

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of weed/kelp	(CATWED)	1 : kelp 2 : seaweed 3 : seagrass 4 : sargasso	EN	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

**INT 1 Reference:** J 13.1, 13.2

#### **12.2.1 Weed - Kelp (see S-4 – B-428.2)**

If it is required to encode marine weed or kelp, it must be done using the **feature Weed/Kelp**.

**Remarks:**

- For the mariner, the presence of kelp is also generally an indication of the presence of submerged rocks.

<u>Distinction:</u> Seabed area; vegetation.
--

### 12.3 Sandwaves

<b>IHO Definition:</b> <b>SANDWAVES.</b> Large mobile wave-like sediment feature in shallow water and composed of sand. The wavelength may reach 100 metres; the amplitude may be up to 20 metres. (IHO Dictionary – S-32).				
<b>S-101 Geo Feature:</b> Sandwave (SNDWAV)				
<b>Primitives:</b> Point, Curve, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Vertical length	(VERLEN)		RE	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<b>INT 1 Reference:</b> J 14				
<b>12.3.1 Sandwaves (see S-4 – B-428.1)</b>				
Sandwave areas may be dangerous to mariners, as the depth may be less than charted, because surveys are not necessarily conducted at the ideal time for sandwave building. Some research has shown that sandwave mobility is most evident in the vertical plane and high spots may occur on crest lines in response to calm weather, and possibly during particular times within the tidal cycle. It is therefore important to warn the mariner of the presence of sandwaves, and provide them with as much information as is available and can be included in the ENC.				
If it is required to encode sandwaves, this must be done using the <b>feature Sandwave</b> .				
<b>Remarks:</b> <ul style="list-style-type: none"> <li>The attribute <b>vertical length</b> is used to populate the amplitude of the sandwave above the seafloor, where known.</li> <li>Care must be taken not to over-generalize depth depiction in sandwave areas, as the typically convoluted contour pattern, and significant depth changes between soundings selected from crests and troughs, help to draw attention to these features. However, this will not usually be sufficient warning, as the variance between crest and trough may fall between standard contours, or the maximum display scale for the ENC data may be insufficient to show the sandwaves individually, or anything but the shoalest soundings. Attention should therefore be drawn to the area by encoding a <b>Sandwave</b> feature. If considered necessary, the nature of any navigational hazard presented by the sandwaves may be incorporated using the complex</li> </ul>				

attribute information or a note referenced by the complex attribute textual description.

- Where frequently repeated surveys show variations in least depth, the shoalest soundings obtained over a period of years should be encoded. This blending of details from surveys of differing dates must be done with care; in particular, long-term deepening must not be overlooked.

Distinction: Seabed area.

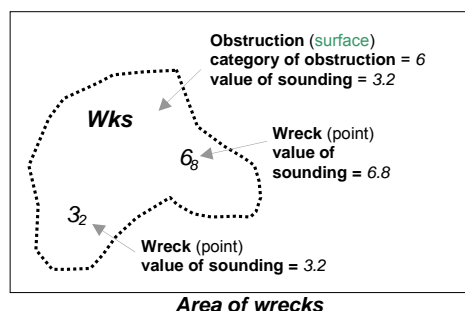
## 12.4 Springs in the seabed

IHO Definition: <b>SPRING</b> . A natural issue of water or other substances from the earth. One on the bottom of the sea is called a submarine spring. (IHO Dictionary – S-32).				
<b>S-101 Geo Feature: Spring (SPRING)</b>				
<b>Primitives: Point</b>				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><u>INT 1 Reference:</u> J 15</p> <p><b>12.4.1 Springs in the seabed (see S-4 – B-428.3)</b></p> <p>Springs in the seabed may cause false echo-soundings. If it is required to encode a spring in the seabed, it must be done using the feature <b>Spring</b>.</p> <p><u>Remarks:</u></p> <ul style="list-style-type: none"> <li>No remarks.</li> </ul> <p><u>Distinction:</u></p>				

### 13 Rocks, Wrecks, Foul Ground, Obstructions

Full details of all dangers to navigation must be encoded except in those areas for which the ENC is clearly inappropriate for navigation. The fullest possible information on clearance depths must be given irrespective of their depths, in preference to making any arbitrary distinction between “dangerous” and “non-dangerous” depths. This will allow navigators of all classes of vessels, including deep-draught ships and submarines, to make their own assessments of what is dangerous to them.

#### 13.1 Danger line limiting an area of wrecks or obstructions



The area enclosed by the danger line must be encoded using **Wreck** (see clause X.X) or **Obstruction** (see clause X.X) features of type **surface**, with the attribute values, when encoded, reflecting the characteristics of the shallowest point feature encoded in the area. The area must also be covered by **Depth Area** or **Unsurveyed Area** features as appropriate.

If it is required to encode one or more least depths in such an area, it must be done using a point feature for each of the depths, in addition to the **surface** feature.

#### 13.2 Danger line bordering an area through which navigation is not safe (see S-4 – B-420.1)

A danger line, bordering an area through which navigation is not safe, should be encoded using an **Obstruction** feature of type **surface**, with attribute **category of obstruction** = 6 (foul area).

#### 13.3 Doubtful dangers (see S-4 – B-424)

The fact that a danger is doubtful should be encoded using the feature attributes **quality of sounding measurement** and **status** and the spatial attribute **quality of position** for the feature:

	S-4	INT 1	quality of position	quality of sounding measurement	status
Position approximate	B-424.1	B7	4		
Position doubtful	B-424.2	B8	5		
Existence doubtful	B-424.3	I1			18
Doubtful sounding	B-424.4	I2		3	
Reported danger	B-424.5	I3.1, 3.2	7 or 8	8 or 9	

Remarks:

- The same notions of approximate or doubtful positions and doubtful existence also apply to features other than dangers (e.g. landmarks, buoys).
- The text "Discoloured water" on the source indicates the probable existence of shallow water. This should be encoded using a **Caution Area** feature (see clause X.X) with **complex** attribute **information** or **textual description** containing a cautionary note (see clause X.X).



### 13.4 Land area

<b>IHO Definition:</b> <b>LAND AREA.</b> The solid portion of the Earth's surface, as opposed to sea, water. (IHO Dictionary – S-32).				
<b>S-101 Geo Feature:</b> Land area (LNDARE)				
<b>Primitives:</b> Point, Curve, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Condition	(CONDTN)	1 : under construction 3 : under reclamation 5 : planned construction	EN	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Status	(STATUS)	6 : reserved 7 : temporary 8 : private 12 : illuminated 14 : public 16 : watched 17 : un-watched 18 : existence doubtful	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<b>INT 1 Reference:</b> K 10				
<b>13.4.1 Land area</b>				

Land areas that are never covered by the sea must be encoded using the **feature Land Area**.

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

Remarks:

- If it is required to describe the natural scenery of the land, it must be done using the **feature Land Region** (see clause **X.X**).
- **Land Area** is usually of type **surface**; it may, however, be of type point (e.g. islet, rock that does not cover), or of type **curve** (e.g. islet, offshore bar, isthmus).
- **Land Area of type curve or point must not be encoded on top of Land Area of type surface, unless it is also covered by a Lake, River, Dock Area, Lock Basin or Canal feature of type surface.**
- **The limits of a Land Area of type surface must share the geometry of at least one of the following features:**
  - **Coastline, Shoreline Construction, Gate, Dam of type curve;**
  - **Data Coverage, Gate, Dam, River, Tunnel, Dry Dock, Canal, Lake, Lock Basin, Dock Area, Land Area of type surface;**
  - **Causeway, Shoreline Construction, Mooring/Warping Facility, Wreck, Obstruction, Pylon/Bridge Support of type surface; and having attribute water level effect = 1 (partly submerged at high water), 2 (always dry) or 6 (subject to inundation or flooding).**
- **Land Area features of type surface** are part of **Group 1**.

Comment [j69]: S-58 check 55.

Comment [j70]: S-58 check 1565.

#### 13.4.2 Rocks which do not cover (islets) (see S-4 – B-421.1)

A **surface feature** must be encoded using:

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

A **curve feature** must be encoded using:

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

A point **feature** must be encoded using:

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

Distinction: Canal; coastline; depth area; lake; land region; river; **seabed** area; shoreline construction; vegetation.

### 13.5 Rocks (intertidal/awash/submerged)

**IHO Definition: UNDERWATER/AWASH ROCK.** A concreted mass of stony material or coral which dries, is awash or is below the water surface. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.194, November 2000).

**S-101 Geo Feature: Underwater/awash rock (UWTROC)**

**Primitives: Point**

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Exposition of sounding	(EXPSOU)	1 : within the range of depth of the surrounding depth area 2 : shoaler than the range of depth of the surrounding depth area 3 : deeper than the range of depth of the surrounding depth area	EN	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Surface quality			C	0,1
Nature of surface	(NATSUR)	9 : rock 14 : coral 18 : boulder	(S) EN	1,1
Nature of surface – qualifying terms	(NATQUA)	4 : broken 6 : soft 7 : stiff 8 : volcanic 9 : calcareous 10 : hard	(S) EN	0,1
Surface layer			(S) IN	0,0
Quality of sounding measurement	(QUASOU)	1 : depth known 2 : depth or least depth unknown 3 : doubtful sounding 4 : unreliable sounding 6 : least depth known 7 : least depth unknown, safe clearance at value shown 8 : value reported (not surveyed) 9 : value reported (not confirmed)	EN	0,*
Sounding uncertainty	(SOUACC)		RE	0,1

**Comment [j71]:** MD8 – 4.Co.11 and 4.Cl.9.

Status	(STATUS)	18 : existence doubtful	EN	0,1										
Technique of sounding measurement	(TECSOU)	1 : found by echo-sounder 2 : found by side scan sonar 3 : found by multi-beam 4 : found by diver 5 : found by lead-line 6 : swept by wire-drag 7 : found by laser 8 : swept by vertical acoustic system 9 : found by electromagnetic sensor 10 : photogrammetry 11 : satellite imagery 12 : found by leveling 13 : swept by side-scan sonar	EN	0,*										
Value of sounding	(VALSOU)		RE	0,1										
Water level effect	(WATLEV)	3 : always under water/ submerged 4 : covers and uncovers 5 : awash	EN	0,1										
Information			C	0,*										
Language		ISO 639-3	(S) TE	0,1										
Text	(INFORM)		(S) TE	1,1										
Textual description			C	0,*										
File reference	(TXTDSC)		(S) TE	1,1										
Language		ISO 639-3	(S) TE	0,1										
Scale minimum	(SCAMIN)		IN	0,1										
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1										
Recording indication	(RECIND)		TE	0,1										
Source indication			C	0,*										
Authority			(S) TE	1,1										
Nationality			(S) TE	1,1										
ID code			(S) TE	0,1										
Source			(S) TE	0,1										
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1										
<p><b>INT 1 Reference:</b> K 11-15</p> <p><b>13.5.1 Rocks which may cover (see S-4 – B-421.2 to B-421.4)</b></p> <p>Full details of all dangers to navigation must be encoded except in those areas for which the ENC is clearly inappropriate for navigation (see S-4 – B-401 and B-402). The fullest possible information on clearance depths must be given irrespective of their depths, where known, in preference to making any arbitrary distinction between "dangerous" and "non-dangerous" depths. This will allow navigators of all classes of vessels, including deep-draught ships and submarines, to make their own assessments of what is dangerous to them.</p> <p><b>Underwater</b> rocks may cover and uncover, may be awash, or may be always underwater.</p> <p>Population of the attributes <b>quality of sounding measurement</b>, <b>water level effect</b>, <b>source date</b> and the spatial attribute <b>quality of position</b> are described in the Table below:</p> <table border="1"> <thead> <tr> <th>Rock or coral reef</th><th>INT 1</th><th>water level effect</th><th>quality of sounding measurement</th><th>Comment</th></tr> </thead> <tbody> <tr> <td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>					Rock or coral reef	INT 1	water level effect	quality of sounding measurement	Comment					
Rock or coral reef	INT 1	water level effect	quality of sounding measurement	Comment										

Covers and uncovers, depth unknown	K11	4	2 or <undefined>	
Covers and uncovers, depth known	K11	4	any value except 2 or 5; or <undefined>	Negative value for <b>value of sounding</b>
Awash	K12	5		
Underwater rock, depth unknown	K13	3	2 or <undefined>	
Underwater rock, depth known	K14	3	any value except 2 or 5; or <undefined>	
Reported, not confirmed	I3.1,3.2	3,4 or 5	9	If available, the year reported should be encoded in <b>source date</b> . The attribute <b>quality of position</b> should be set to 8 (reported, not confirmed).

Comment [J72]: S-58 Check 1657.

Remarks:

- For rocks which do not cover (islets), see clause X.X.
- All **Underwater/Awash Rock features** should be encoded using one of the above combinations of attributes.
- For guidance regarding the population of the attribute **sounding uncertainty**, see clause X.X (**Quality of Bathymetric Data**).
- A rock represented by a spot sounding and an associated nature of seabed (underwater rock not dangerous to surface navigation) **should** be encoded using a single **Underwater/Awash Rock feature**, with the **sounding value encoded using the attribute value of sounding**. Where **Underwater/Awash Rock** is encoded, there must be no **Sounding** feature encoded coincident.
- For area rock and coral reef features, see clause X.X.
- When a group of rocks is surrounded by a danger line, each rock should be encoded as a separate **Underwater/Awash Rock feature** covered by an obstruction area **feature** (**Obstruction – see clause X.X**).

Distinction: Obstruction; seabed area; sounding; wreck.

### 13.6 Wrecks

<b>IHO Definition:</b> <b>WRECKS.</b> The ruined remains of a stranded or sunken vessel which has been rendered useless. (IHO Dictionary – S-32).				
<b>S-101 Geo Feature:</b> Wreck (WRECKS)				
<b>Primitives:</b> Point, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of wreck	(CATWRK)	1 : non-dangerous wreck 2 : dangerous wreck 3 : distributed remains of wreck 4 : wreck showing mast/masts 5 : wreck showing any portion of hull or superstructure	EN	0,1
Exposition of sounding	(EXPSOU)	1 : within the range of depth of the surrounding depth area 2 : shoaler than the range of depth of the surrounding depth area 3 : deeper than the range of depth of the surrounding depth area	EN	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
Quality of sounding measurement	(QUASOU)	1 : depth known 2 : depth <b>or least depth</b> unknown 3 : doubtful sounding 4 : unreliable sounding 6 : least depth known 7 : least depth unknown, safe clearance at value shown 8 : value reported (not surveyed) 9 : value reported (not confirmed)	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Sounding uncertainty	(SOUACC)		RE	0,1
Status	(STATUS)	7 : temporary 13 : historic	EN	0,*

**Comment [j73]:** MD8 – 4.Co.11 and 4.Cl.9.

		18 : existence doubtful		
Technique of sounding measurement	(TECSOU)	1 : found by echo-sounder 2 : found by side scan sonar 3 : found by multi-beam 4 : found by diver 5 : found by lead-line 6 : swept by wire-drag 7 : found by laser 8 : swept by vertical acoustic system 9 : found by electromagnetic sensor 10 : photogrammetry 11 : satellite imagery 12 : found by leveling 13 : swept by side-scan sonar	EN	0,*
Value of sounding	(VALSOU)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Water level effect	(WATLEV)	1 : partly submerged at high water 2 : always dry 3 : always under water/ submerged 4 : covers and uncovers 5 : awash	EN	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: K 20-31; N 26

### 13.6.1 Wrecks (see S-4 – B-422, B-422.1 to B-422.8)

Wrecks must be encoded to whatever depth they are considered to be of interest, also taking account of the needs of submarines and fishing vessels where appropriate, but not generally in water deeper than 2000m. (Trawling regularly takes place in depths of 400m and occasionally in depths as great as 2000m).

Population of the attributes **category of wreck**, **quality of sounding measurement**, **technique of sounding measurement** and **water level effect** are described in the Table below.

In the following table, the symbol '/' indicates that this attribute must not be encoded. A blank indicates that the encoder may choose a relevant value for the attribute.

Wrecks...	S-4	INT 1	category of wreck	water level effect	quality of sounding measurement	technique of sounding measurement
Showing any part of hull or superstructure	B-422.2	K24 K20	5	1,2 or 4	/	/
Covers and uncovers	B-422.2	K24 K21	4 or 5	4		
Awash				5		
The mast only is visible at high water	B-422.2	K25	4 or 5	2	/	/
The mast only is visible at low water	B-422.2	K25	4	4		
Measured depth	B-422.4	K26		3	1, 6 or <undefined>	
Depth measured and swept by wire drag	B-422.3	K27		3	6	6
Depth measured by diver	B-422.3	K27		3	1 or 6	4
Depth unknown, considered dangerous by the responsible producing authority	B-422.6	K28	2	3	2* or <undefined>	/
Depth unknown, not considered dangerous by the responsible producing authority	B-422.6	K29	1	3	2* or <undefined>	/
Depth unknown, with a safe clearance	B-422.5	K30		3	7	/
Distributed remains of wreck	B-422.8	K31	3			
Reported, not confirmed	B-424.5	I3.1 I3.2			9	

All wrecks should be encoded using one of the above combinations of attributes.

\* For a wreck where the least depth is unknown, the attribute value 2 (depth or least depth unknown) for **quality of sounding measurement** does not apply to the depth of the sea bottom near the wreck.

Comment [J74]: MD8 – 4.Cl.9.

The provision of more quantitative information for wrecks where possible is particularly important in terms of the portrayal of wrecks in ECDIS. Conditional Symbology Procedures in the IHO Specifications for Chart Content and Display Aspects of ECDIS (S-52) Annex A – ECDIS Presentation Library, do not take into account the classification of wrecks as “dangerous” or “non-dangerous” when symbolising. This often results in wrecks being symbolised as an obstruction to navigation where they are actually non-dangerous. Where the depth of the wreck is unknown, compilers should consider determining an estimated safe clearance value (see S-4 – B-422.5) and populating **quality of sounding measurement** = 7 (least depth unknown, safe clearance at value shown).

#### Remarks:

- A **Wreck feature** of type **surface** must be covered by a **surface feature** from Group 1 as appropriate.
- At least one of the attributes **category of wreck** or **value of sounding measurement** must be populated.
- The attribute **height** is only relevant for wrecks having attribute **water level effect** = 1 (partly submerged at high water) or 2 (always dry).
- For guidance regarding the population of the attribute **sounding uncertainty**, see clause X.X (**Quality of Bathymetric Data**).
- When encoding a **Wreck feature**, the attributes populated should adhere to the guidance in S-4 Clause B-422. Where possible, this includes the population of the attributes **value of sounding** and **quality of sounding measurement** where the depth of a wreck is known, or the depth is unknown but an estimated safe clearance can be determined. Where the depth is known, or the depth is unknown but an estimated safe clearance has been determined, it is not required to populate the attribute **category of wreck** = 1 (non-dangerous wreck) or 2 (dangerous wreck), as the mariner has the quantitative information in order to determine whether the wreck may be dangerous to their type of vessel. In such cases, **category of wreck** should be populated with an empty (null) value.
- For wrecks visible or partly visible at sounding datum, the height or drying height should be encoded, if known. This helps to distinguish wrecks which are always visible from wrecks which are only visible at low tide.

#### 13.6.1.1 Where a wreck is shown with its true shape (large scale ENCs) (see S-4 – B-422.1)



Soundings and heights are often given inside a wreck to show the highest points of the hull or superstructure (e.g. mast, funnel). If it is required to encode such **features**, they must be done using:

- A **Wreck feature** of type **surface** with all populated attributes applying to the highest point of the wreck.
- **Land Elevation features** of type **point** to encode the **features** of the wreck that are always dry; the type of each **feature** (e.g. mast, funnel) may be encoded using the **complex** attribute **information**.
- **Sounding features** to encode the features of wrecks which are always submerged, or cover and uncover; the type of each **feature** (e.g. mast, funnel) may be encoded using **information**, which means that these soundings must be encoded individually.

#### 13.6.1.2 Changing criteria for wrecks

Historically the criteria used for differentiating between "dangerous" and "non-dangerous" wrecks were often based on a threshold value for the estimated depth over the wreck (e.g. 20m, 28m). Criteria have varied between nations and over time (due to the increasing draught of large vessels). The term "non-dangerous wreck" may be applied even though a wreck may be dangerous to some vessels capable of navigating in the vicinity. Unfortunately, the mariner is not necessarily aware of that fact or that, due to the changing criteria, wrecks encoded as "non-dangerous" may have different meanings. Ideally, therefore, all encoded "dangerous" and "non-dangerous" wrecks having no known depth should be re-assessed to conform to the guidance provided in S-4 – B-422.

#### 13.6.2 Historic wrecks (see S-4 – B-449.5)

Many nations have designated areas around certain wrecks of historical or cultural (e.g. sea graves) importance to protect the wrecks from unauthorised interference (e.g. by diving, salvage or anchoring). Such areas should be encoded on the **largest** maximum display scale **ENC** data covering the wreck.

If it is required to encode a restricted area around a historic wreck, it must be done using a **Restricted Area feature** (see clause X.X), with attribute **category of restricted area** = 10 (historic wreck area).

In addition, the wreck itself should be encoded as a **Wreck feature**, with attribute **status** = 13 (historic).

Distinction: Depth area; hulk; obstruction; sounding; underwater/awash rock.

### 13.7 Obstructions

<b>IHO Definition:</b> <b>OBSTRUCTION.</b> In marine navigation, anything that hinders or prevents movement, particularly anything that endangers or prevents passage of a vessel. The term is usually used to refer to an isolated danger to navigation. (IHO Dictionary – S-32).				
<b>S-101 Geo Feature: Obstruction (OBSTRN)</b>				
<b>Primitives:</b> Point, Curve, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of obstruction	(CATOBS)	1 : snag/stump 2 : wellhead 3 : diffuser 4 : crib 5 : fish haven 6 : foul area 8 : ice boom 9 : ground tackle 10 : boom	EN	0,1
Condition	(COND TN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Exposition of sounding	(EXPSOU)	1 : within the range of depth of the surrounding depth area 2 : shoaler than the range of depth of the surrounding depth area 3 : deeper than the range of depth of the surrounding depth area	EN	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
Product	(PRODUCT)	1 : oil 2 : gas 3 : water 8 : drinking water	EN	0,*
Quality of sounding measurement	(QUASOU)	1 : depth known 2 : depth or least depth unknown 3 : doubtful sounding 4 : unreliable sounding 6 : least depth known 7 : least depth unknown, safe clearance at value shown 8 : value reported (not	EN	0,*

**Comment [j75]:** MD8 – 4.Co.11 and 4.Cl.9.

		surveyed) 9 : value reported (not confirmed)		
Sounding uncertainty	(SOUACC)		RE	0,1
Status	(STATUS)	1 : permanent 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 13 : historic 18 : existence doubtful 19 : buoyed	EN	0,*
Surface quality			C	0,* (ordered)
Nature of surface	(NATSUR)	1 : mud 2 : clay 3 : silt 4 : sand 5 : stone 6 : gravel 7 : pebbles 8 : cobbles 9 : rock 11 : lava 14 : coral 17 : shells 18 : boulder	(S) EN	1,1
Nature of surface – qualifying terms	(NATQUA)	1 : fine 2 : medium 3 : coarse 4 : broken 5 : sticky 6 : soft 7 : stiff 8 : volcanic 9 : calcareous 10 : hard	(S) EN	0,1
Surface layer			(S) IN	0,0
Technique of sounding measurement	(TECSOU)	1 : found by echo-sounder 2 : found by side scan sonar 3 : found by multi-beam 4 : found by diver 5 : found by lead-line 6 : swept by wire-drag 7 : found by laser 8 : swept by vertical acoustic system 9 : found by electromagnetic sensor 10 : photogrammetry 11 : satellite imagery 12 : found by leveling 13 : swept by side-scan sonar	EN	0,*
Value of sounding	(VALSOU)		RE	0,1
Vertical length	(VERLEN)		RE	0,1
Water level effect	(WATLEV)	1 : partly submerged at high water 2 : always dry 3 : always under water/ submerged 4 : covers and uncovers 5 : awash 7 : floating	EN	1,1

**Comment [j76]:** S-57  
Extension 06/01.

**Comment [A77]:** Do not  
consider that this is needed for  
Obstruction.

Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: K 1, 31, 40-43, 46; L 21, 23; Q 42

### 13.7.1 Obstructions and foul areas (see S-4 – B-327.5, B-420.1, B-422.8-9, B-431.6, B-445.1 and B-447.5)

Full details of all dangers to navigation must be encoded except in those areas for which the ENC is clearly inappropriate for navigation (see S-4 – B-401 and B-402). The fullest possible information on clearance depths must be given irrespective of their depths, where known, in preference to making any arbitrary distinction between “dangerous” and “non-dangerous” depths. This will allow navigators of all classes of vessels, including deep-draught ships and submarines, to make their own assessments of what is dangerous to them.

If it is required to encode snags, stumps, wellheads, diffusers, cribs, fish havens, foul areas, foul grounds, booms, ice booms, sites of cleared platforms or ground tackle, it must be done using the feature **Obstruction**.

Population of the attributes **quality of sounding measurement**, **technique of sounding measurement** and **water level effect** are described in the Table below.

In the following table, the symbol ‘/’ indicates that this attribute must not be encoded. A blank indicates that the encoder may choose a relevant value for the attribute.

Obstruction...	INT 1	water level effect	quality of sounding measurement	technique of sounding measurement
Depth unknown	K40	3 or 4	2* or <undefined>	/
Least depth known	K41	3 or 4	1 or 6	
Swept by wire to the depth shown	K42	3	6	6
Measured by diver	K42	3	1 or 6	4

All obstructions should be encoded using one of the above combinations of attributes.

\* For an obstruction where the least depth is unknown, the attribute value 2 (depth or least depth unknown) for **quality of sounding measurement** does not apply to the depth of the sea bottom near the obstruction.

#### Remarks:

- The minimum depth or maximum authorised draught, if known, over any obstruction, must be encoded using the attribute **value of sounding**.
- The attribute **height** must be populated for **Obstruction** features having attribute **water level effect** = 1 (partly submerged at high water) or 2 (always dry).
- The attribute **product** is only relevant for wellheads (**category of obstruction** = 2).

- For guidance regarding the population of the attribute **sounding uncertainty**, see clause X.X (Quality of Bathymetric Data).
- If the nature of a dangerous underwater **feature**, dangerous underwater area, or floating feature is not explicitly known, it must be encoded using **Obstruction**.
- An **Obstruction feature** of type **surface** must be covered by a **surface feature** from Group 1 as appropriate.
- An area **containing numerous dangers**, through which navigation is not safe **at the maximum display scale for the ENC data**, should be encoded using an **Obstruction feature** of type **surface**, with attribute **category of obstruction** = 6 (foul area).
- A danger **circle on a paper chart** that surrounds a single symbol or sounding (e.g. INT1 – K26, K27, K40(b) or K41 to K43.1) **must** not be encoded as a separate **surface**. However, when a danger line indicates the true shape of the feature, it should be encoded using **Wreck** or **Obstruction features** of type **surface**. A single sounding enclosed by a danger **circle on medium and large maximum display scale ENC datasets** must be encoded using an **Obstruction feature** of type point. The sounding value, in this case, must be encoded using the attribute **value of sounding**, with the attribute **exposition of sounding** populated only if shoaler than or equal to the range of depth of the surrounding area. Soundings enclosed by a danger circle on small scale paper charts indicate a reported, not confirmed sounding, and such soundings should be encoded as **Sounding features** (see clause X.X), with attribute **QUAOU** = 9 (value reported (not confirmed)).
- Platforms which have been cut-off above the seabed must be encoded as **Obstruction**, while platforms which have been cut-off to the level of the seabed should be encoded as **Foul Ground** (see clause X.X).
- In certain circumstances where an obstruction is always dry (e.g. cribs), it may be covered by a **Land Area feature**.
- Vessels deliberately sunk to form fish havens should be encoded as a **Wreck feature** (see clause X.X).

Distinction: Depth area; fishing facility; **foul ground**; marine farm/culture; underwater/awash rock; water turbulence; wreck.

### 13.8 Foul ground

**IHO Definition:** **FOUL GROUND.** Areas over which it is safe to navigate but which should be avoided for anchoring, taking the ground or ground fishing. (IHO Dictionary – S-32).

#### **S-101 Geo Feature:** Foul ground

**Primitives:** Point, Curve, Surface

Real World		Paper Chart Symbol	ECDIS Symbol		
S-101 Attribute		S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Exposition of sounding		(EXPSOU)	1 : within the range of depth of the surrounding depth area 2 : shoaler than the range of depth of the surrounding depth area 3 : deeper than the range of depth of the surrounding depth area	EN	0,1
Feature name				C	0,*
Category of name			1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language			ISO 639-3	(S) TE	0,1
Name		(OBJNAM)		(S) TE	1,1
Quality of sounding measurement		(QUASOU)	1 : depth known 2 : depth or least depth unknown 3 : doubtful sounding 4 : unreliable sounding 6 : least depth known 7 : least depth unknown, safe clearance at value shown 8 : value reported (not surveyed) 9 : value reported (not confirmed)	EN	0,*
Sounding uncertainty		(SOUACC)		RE	0,1
Status		(STATUS)	1 : permanent 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 13 : historic 18 : existence doubtful 19 : buoyed	EN	0,*
Surface quality				C	0,* (ordered)
Nature of surface		(NATSUR)	1 : mud 2 : clay 3 : silt 4 : sand 5 : stone	(S) EN	1,1

**Comment [j78]:** MD8 – 4.Co.11 and 4.Cl.9.

**Comment [j79]:** S-57 Extension 06/01.

		6 : gravel 7 : pebbles 8 : cobbles 9 : rock 11 : lava 14 : coral 17 : shells 18 : boulder		
Nature of surface – qualifying terms	(NATQUA)	1 : fine 2 : medium 3 : coarse 4 : broken 5 : sticky 6 : soft 7 : stiff 8 : volcanic 9 : calcareous 10 : hard	(S) EN	0,1
Surface layer			(S) IN	0,1
Technique of sounding measurement	(TECSOU)	1 : found by echo-sounder 2 : found by side scan sonar 3 : found by multi-beam 4 : found by diver 5 : found by lead-line 6 : swept by wire-drag 7 : found by laser 8 : swept by vertical acoustic system 9 : found by electromagnetic sensor 10 : photogrammetry 11 : satellite imagery 12 : found by leveling 13 : swept by side-scan sonar	EN	0,*
Value of sounding	(VALSOU)		RE	0,1
Water-level effect	(WATLEV)	1 : partly-submerged-at high water 2 : always-dry 3 : always-under-water / —submerged 4 : covers-and-uncovers 5 : awash 6 : subject-to-inundation-or flooding	EN	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1

**Comment [A80]:** Do not consider that this is needed for PINGOS.

ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

#### INT 1 Reference:

##### 13.8.1 Foul ground (see S-4 – B-422.8)

If it is required to encode an area over which it is safe to navigate for surface vessels, but where seabed operations are unsafe, it should be done using the feature **Foul Ground**. Such areas are distinct from the feature **Obstruction**, category of obstruction **foul area**, where navigation is considered to be unsafe for surface vessels.

Population of the attributes **quality of sounding measurement** and **technique of sounding measurement** are described in the Table below.

In the following table, the symbol '/' indicates that this attribute must not be encoded. A blank indicates that the encoder may choose a relevant value for the attribute.

Obstruction...	INT 1	quality of sounding measurement	technique of sounding measurement
Depth unknown	K40	2* or <undefined>	/
Least depth known	K41	1 or 6	
Swept by wire to the depth shown	K42	6	6
Measured by diver	K42	1 or 6	4

All foul ground should be encoded using one of the above combinations of attributes.

\* For foul ground where the least depth is unknown, the attribute value 2 (depth or least depth unknown) for **quality of sounding measurement** does not apply to the depth of the sea bottom near the foul ground.

#### Remarks:

- The minimum depth or maximum authorised draught, if known, over any foul ground, must be encoded using the attribute **value of sounding**.
- For guidance regarding the population of the attribute **sounding uncertainty**, see clause X.X (Quality of Bathymetric Data).
- A **Foul Ground** feature of type surface must be covered by a surface feature from Group 1 as appropriate.
- Platforms which have been cut-off to the level of the seabed should be encoded as **Foul Ground**, while platforms which have been cut-off above the seabed must be encoded as **Obstruction** (see clause X,X).
- The distributed remains of wrecks must be encoded using the feature **Wreck**, and must not be encoded as **Foul Ground**.

Distinction: Depth area; fishing facility; marine farm/culture; obstruction; seabed area; underwater/awash rock; water turbulence; wreck.



### 13.9 Fishing facility

**IHO Definition: FISHING FACILITY.** A structure in shallow water for fishing purposes which can be an obstruction to ships in general. The position of these structures may vary frequently over time. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.70, November 2000).

**Comment [j81]:** MD8 – 8.Cl.3 and 8.Co.4

#### **S-101 Geo Feature: Fishing facility (FSHFAC)**

**Primitives:** Point, Curve, Surface

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of fishing facility	(CATFIF)	1 : fishing stake 2 : fish trap 3 : fish weir 4 : tunny net	EN	0,1
Date range			C	0,1
Date end	(PEREND)	ISO 8601:1988	(S) DA	0,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	1,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Status	(STATUS)	1 : permanent 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 12 : illuminated 16 : watched 17 : un-watched 19 : buoyed	EN	0,*
Vertical length	(VERLEN)		RE	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1

**Comment [j82]:** S-57 Extension 06/01.

Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><u>INT 1 Reference:</u> K 44, 45</p> <p><b>13.9.1 Fishing facilities (see S-4 – B-447 and B-447.1-3)</b></p> <p>Fishing facilities are usually sited in shallow water, but tunny nets are often located in deeper water. They can be very large and extend up to several miles offshore; and form an obstruction to navigation.</p> <p>If it is required to encode a fishing facility it must be done using the <b>feature Fishing Facility</b>.</p> <p><u>Remarks:</u></p> <ul style="list-style-type: none"> <li>The attribute <b>vertical length</b> is used to populate the distance of the facility above the seabed.</li> <li>Certain types of fishing facilities such as tunny nets in deep water may be an obstruction to navigation. If <b>Fishing Facility</b> features are considered to be an obstruction or hazard to navigation, they should also be encoded with an <b>Obstruction</b> feature. Although this is contrary to ENC encoding principles (i.e. double encoding), this solution is recommended for portraying dangers to navigation of this nature in the ECDIS.</li> </ul> <p><u>Distinction:</u> Marine farm/culture; obstruction.</p>				

## 13.10 Marine farm/culture

**IHO Definition:** **MARINE FARM/CULTURE.** An assemblage of cages, nets, rafts and floats or posts where fish, including shellfish, are artificially cultivated. Also called fish farm. (IHO Dictionary – S-32).

**S-101 Geo Feature:** Marine farm/culture (MARCUL)

**Primitives:** Point, Curve, Surface

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of marine farm/culture	(CATMFA)	1 : crustaceans 2 : edible bivalve molluscs 3 : fish 4 : seaweed 5 : pearl culture farm	EN	0,1
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Exposition of sounding	(EXPSOU)	1 : within the range of depth of the surrounding depth area 2 : shoaler than the range of depth of the surrounding depth area 3 : deeper than the range of depth of the surrounding depth area	EN	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Quality of sounding measurement	(QUASOU)	1 : depth known 2 : depth or least depth unknown 3 : doubtful sounding 4 : unreliable sounding 6 : least depth known 7 : least depth unknown, safe clearance at value shown 8 : value reported (not surveyed) 9 : value reported (not confirmed)	EN	0,*
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited	EN	1,*

Comment [J83]: MD8 – 5.Co.2

Comment [J84]: MD8 – 4.Co.11 and 4.Cl.9.

		6 : trawling restricted 7 : entry prohibited 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 14 : area to be avoided 15 : construction prohibited 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transshipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 26 : landing prohibited 27 : speed restricted 28 : swimming prohibited		
Sounding uncertainty	(SOUACC)		RE	0,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 14 : public 16 : watched 17 : un-watched 19 : buoyed	EN	0,*
Value of sounding	(VALSOU)		RE	0,1
Vertical length	(VERLEN)		RE	0,1
Water level effect	(WATLEV)	1 : partly submerged at high water 2 : always dry 3 : always under water/ submerged 4 : covers and uncovers 5 : awash 7 : floating	EN	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1

Comment [j85]: S-57  
Extension 06/01

Comment [j86]: S-57  
Extension 06/01.

Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: K 47, 48

**13.10.1 Marine farms (see S-4 – B- 447.4 and B-447.6)**

Marine farms are collections of cages, nets, rafts and floats, or posts, where fish, including shellfish, are reared. They may obstruct navigation, and are likely to be marked by buoys and possibly lights. They are not always confined to inshore locations. Shellfish beds are found in shallow water. Dependant on vessel draught and tidal range, it is usually possible to navigate over them, at high water, but they can be damaged by vessels anchoring or grounding on them.

If it is required to encode a marine farm, it must be done using the **feature Marine Farm/Culture**.

Remarks:

- When it is required to encode the minimum depth of the **feature**, the attributes **exposition of sounding** and **quality of sounding measurement** and the mandatory attribute **value of sounding** must be used. When a **Marine Farm/Culture feature** covers an area of the seafloor at the **maximum display scale of the data**, the value of the attribute **value of sounding** represents the minimum depth, if known, over any structure used to form or support the marine farm, or within the area of the marine farm itself. The mandatory attribute **water level effect** must be used to encode the water level of the shallowest section of the area, if partly or completely under water.
- The attribute **height** must be populated for **Marine Farm/Culture** features having attribute **water level effect** = 1 (partly submerged at high water) or 2 (always dry).
- The attribute **vertical length** is used to populate the distance of the marine farm above the seabed.
- Where required, ground tackle associated with marine farms must be encoded as **Obstruction** features (see clause X.X).

**13.10.2 Fish havens (see S-4 – B- 447.5)**

If it is required to encode a fish haven, it must be done using an **Obstruction feature** (see clause X.X), with attribute **category of obstruction** = 5 (fish haven).

Distinction: Fishing facility; obstruction.

## 14 Offshore Installations

### 14.1 Offshore platform

<b>IHO Definition: OFFSHORE PLATFORM.</b> A permanent offshore structure, either fixed or floating. (Adapted from IHO Dictionary – S-32).				
<b>S-101 Geo Feature: Offshore platform (OFSPLF)</b>				
<b>Primitives:</b> Point, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of offshore platform	(CATOFP)	1 : oil derrick/rig 2 : production platform 3 : observation/research platform 4 : articulated loading platform (ALP) 5 : single anchor leg mooring (SALM) 6 : mooring tower 7 : artificial island 8 : floating production, storage and off-loading vessel (FPSO) 9 : accommodation platform 10 : navigation, communication and control buoy (NCCB) 11 : wind motor	EN	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 4 : wingless 5 : planned construction	EN	0,1
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1

**Comment [j87]:** MD8 – 7.Cl.11 and 7.Co.6.

Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,0
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
Product	(PRODCT)	1 : oil 2 : gas 3 : water 8 : drinking water	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 7 : temporary 8 : private 12 : illuminated 16 : watched 17 : un-watched 19 : buoyed	EN	0,*
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Water level effect	(WATLEV)	7 : floating	EN	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

Comment [J88]: S-57  
Extension 06/01.

INT 1 Reference: L 2, 10-15, 17

#### 14.1.1 Offshore platforms (see S-4 – B-445.2; B-445.4 and B-445.5)

Several different types of platforms are in use. They are normally piled steel or concrete structures, the latter held in position on the sea floor by gravity. Tension Leg Platforms (TLP) consist of semi-submersible platforms secured to flooded caissons on the sea floor vertically below them by wires kept in tension by the

buoyancy of the platform.

Platforms may serve a number of purposes. They may carry any of the following equipment: drilling and production equipment; oil and gas separation and treatment plants; pump-line stations; and electricity generators. They may be fitted with cranes, a helicopter landing deck, and accommodation for up to 350 people. Platforms may stand singly or in groups connected by pipelines. Some stand close together in a complex, with bridges and underwater cables connecting them. Unwanted gas or oil is sometimes burnt from a flaring boom extending from the platform or from a nearby flare stack.

If it is required to encode a permanent offshore platform, it must be done using the **feature Offshore Platform**.

**Remarks:**

- The attribute **height** is only relevant for fixed platforms, and is referred to the vertical datum (see clause X.X).
- The attribute **vertical length** is only relevant for floating platforms, and is referred to the seal level.
- If it is required to encode sites of dismantled platforms, this must be done using **Obstruction features** (see clause X.X), with attribute **category of obstruction** = 7 (foul ground).
- Platforms may carry lights (see clause X.X), fog signals (see clause X.X) and helicopter platforms (see clause X.X).

#### 14.1.2 Wellheads (see S-4 – B-445.1)

In the course of developing an oil or gas field, numerous wells may be drilled. Some, which will not be required again, may be sealed at or below the sea floor and abandoned; such wells must not be encoded, as they have no relevance to navigation.

A submerged wellhead is a submarine structure projecting some distance above the sea floor and capping a temporarily abandoned (or “suspended”) oil or gas well. Their associated pipes and other equipment usually project some 2 - 6 metres, but in some cases as much as 15 metres, above the sea floor. Some may be covered by steel cages to avoid snagging trawling gear. In certain instances, a wellhead may project above the sea surface. Wellheads must be encoded on at least the largest maximum display scale **ENC data**, together with associated buoys, as a hazard to fishing and, dependant on depth, as a hazard to deep-draught vessels and towed structures.

If it is required to encode wellheads, this must be done using **Obstruction features** of type point (see clause X.X), with attributes:

<b>category of obstruction</b>	- 2 - wellhead
<b>height</b>	
<b>status</b>	- 4 - not in use (disused)
<b>value of sounding</b>	
<b>vertical length</b>	- vertical length of the wellhead above the seabed
<b>water level effect</b>	- 2 - always dry (for wellheads that protrude at high water) 3 - always under water/submerged

#### 14.1.3 Offshore safety zones (see S-4 – B-445.6)

Under UNCLOS, a coastal State may establish safety zones around artificial islands, installations and structures in their EEZ and on their continental shelf. These installations include drilling rigs, production platforms, wellheads, moorings and other associated structures. Safety zones normally extend 500 metres from the outermost points of the installations. Within these zones, appropriate measures can be taken to ensure the safety of navigation and of the installations.

If it is required to encode an offshore safety zone, it must be done using a **Restricted Area feature** (see clause X.X), with attribute **category of restricted area** = 1 (offshore safety zone).

#### 14.1.4 Flare stacks (see S-4 – B-445.2)

As with refineries on land, offshore terminals may burn off gas from production platforms or from “flare stacks” set up as separate structures a short distance from the production platforms.

If it is required to encode a flare stack, it must be done using a **Landmark feature** (see clause X.X), with attribute **category of landmark** = 6 (flare stack).

An offshore flare stack may share the same geometry as the platform on which it is installed.

**Distinction:** Buoy, installation; **hulk**; offshore production area.



## 14.2 Submarine cables

IHO Definition: <b>SUBMARINE CABLE</b> . An assembly of wires or fibres, or a wire rope or chain, which has been laid underwater or buried beneath the sea floor. (IHO Dictionary – S-32).				
<b>S-101 Geo Feature: Cable submarine (CBLSUB)</b>				
<b>Primitives:</b> Curve				
Real World	Paper Chart Symbol	ECDIS Symbol		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Buried depth	(BURDEP)		RE	0,1
Category of cable	(CATCBL)	1 : power line 4 : telephone 5 : telegraph 6 : mooring cable/chain	EN	0,1
Condition	(CONDTN)	1 : under construction 5 : planned construction	EN	0,1
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,0
Depth range minimum value	(DRVAL1)		RE	0,1
Depth range maximum value	(DRVAL2)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Status	(STATUS)	1 : permanent 4 : not in use 13 : historic	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1

Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: L 30.1, 31.1, 32; Q 42

#### 14.2.1 Submarine cables (see S-4 – B-443; B-443.1-2 and B-443.7-8)

Submarine cables are used to carry power or telecommunications. All power cables and most telecommunication cables carry dangerous voltages. Submarine cables are potential hazards to both vessels and life, particularly to fishing vessels engaged in trawling the seabed. Where possible, submarine cables are now buried beneath the sea floor in water depths of less than 1000 metres; however there remains a large percentage unburied. Submarine cables are vulnerable to damage from anchoring, trawling or other seabed operations; even small craft anchors can penetrate a soft seabed sufficiently to foul a cable. Damage to telecommunication cables can lead to extensive disruption of national and international communications, whilst damage to power cables can disrupt electricity supply.

Submarine cables, including disused cables, should be encoded to indicate their presence to vessels engaged in anchoring, trawling or seabed activities in order to:

- Warn mariners of the potential hazard to their vessel, including electric shock to any vessel fouling or breaking the cable, possible capsizing of a small vessel if its fishing gear or anchor is trapped under the cable, or loss of gear (trawls or anchor cables).
- Prevent damage to the cable and avoid disrupting the service the cable may be providing.

Active cables should be encoded to a depth of 2000 metres (which is the deepest depth of water to which vessels may be endangered by fouling the cable).

If it is required to encode a submarine cable, it must be done using the **feature Cable Submarine**.

#### Remarks:

- If the buried depth varies along the cable, the cable must be encoded as several features.
- The attributes **depth range minimum value** and **depth range maximum value** are used to encode the shallowest end deepest depth over the cable.
- Where a cable is disused, it should be encoded with the attribute **status** = 4 (not in use), and the attribute **category of cable** should not be encoded. Few disused cables are recovered and so to encode them all would lead to clutter in the data. Also, accurate records of their positions are likely to be incomplete (some cables having been cut or dragged out of position), so there is a case for encoding them very selectively. Where disused cables traverse possible anchorages or where there is known seabed activity, e.g. trawling grounds, they should be encoded on the largest maximum display scale **ENC data** covering the area, provided they do not obscure more important information.
- In certain circumstances, high voltage power cables may cause a deviation in a ship's magnetic compass; in these cases, where reports have been received, they should be treated as local magnetic anomalies (see clause X.X).
- Cables, buried so deep that they are not vulnerable to damage from anchoring, should not be encoded (so that mariners are not unnecessarily inhibited from anchoring or fishing). In marginal cases they may be encoded as **Cable Submarine** with the nominal depth to which they are buried encoded using the attribute **buried depth**.

Distinction: Cable, overhead; cable area.

### 14.3 Submarine cable area

IHO Definition: <b>CABLE AREA.</b> An area in which cables have been laid underwater or buried beneath the seabed. Cable area is an area which contains one or more submarine cables. (IHO Dictionary – S-32).				
<b>S-101 Geo Feature: Cable area (CBLARE)</b>				
<b>Primitives: Surface</b>				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
<b>S-101 Attribute</b>	<b>S-57 Acronym</b>	<b>Allowable Encoding Value</b>	<b>Type</b>	<b>Multiplicity</b>
Category of cable	(CATCBL)	1 : power line 4 : telephone 5 : telegraph	EN	0,1
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,0
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 7 : entry prohibited 8 : entry restricted 9 : dredging prohibited <del>10 : dredging restricted</del> 11 : diving prohibited 12 : diving restricted 13 : no wake 14 : area to be avoided 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited <del>19 : industrial or mineral exploration/development restricted</del> 20 : drilling prohibited <del>21 : drilling restricted</del> <del>22 : removal of historical artefacts prohibited</del> 23 : cargo transshipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited	EN	0,*

		27 : speed restricted 28 : swimming prohibited		
Status	(STATUS)	1 : permanent 7 : temporary 13 : historic	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><b>INT 1 Reference:</b> L 30.2, 31.2</p> <p><b>14.3.1 Submarine cable areas (see S-4 – B-439.3 and B-443.3)</b></p> <p>Cable areas should be encoded where:</p> <ul style="list-style-type: none"> <li>• cables (including disused cables) are so numerous in an area that it would be impossible to encode them individually without impairing the legibility of the ENC; or</li> <li>• a regulatory authority designates an area for the protection of a cable, or cables.</li> </ul> <p>If it is required to encode a submarine cable area, it must be done using the <b>feature Cable Area</b>.</p> <p><b>Remarks:</b></p> <ul style="list-style-type: none"> <li>• Where populated, the attribute <b>status</b> must only be used to encode the status of the area and not the status of the cables in the area.</li> <li>• The outer limits of a cable area must enclose the area in which anchoring and certain forms of fishing are prohibited or inadvisable, i.e., the limits must lie a safe distance beyond the actual lines of the outermost cables.</li> </ul> <p><b>Distinction:</b> Cable, overhead; cable, submarine.</p>				

**Comment [j89]:** S-57  
Extension 06/01.

#### 14.4 Submarine/land pipelines

**IHO Definition: SUBMARINE PIPELINES.** A pipeline is a string of interconnected pipes used for the transport of matter, nowadays mainly oil or gas. (IHO Dictionary – S-32).

A submarine or land pipeline is a pipeline lying on or buried under the seabed or the land. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.120, November 2000).

**S-101 Geo Feature:** Pipeline submarine/on land (PIPSOL)

**Primitives:** ~~Point~~, Curve

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Buried depth	(BURDEP)		RE	0,1
Category of pipeline/pipe	(CATPIP)	2 : outfall pipe 3 : intake pipe 4 : sewer 5 : bubbler system 6 : supply pipe	EN	0,*
Condition	(CONDTN)	1 : under construction 5 : planned construction	EN	0,1
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,0
Depth range minimum value	(DRVAL1)		RE	0,1
Depth range maximum value	(DRVAL2)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Product	(PRODCT)	1 : oil 2 : gas 3 : water 7 : chemicals 8 : drinking water 9 : milk 18 : liquefied natural gas (LNG) 19 : liquefied petroleum gas (LPG) 20 : wine 22 : grain	EN	0,*
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited	EN	0,*

		<del>6 : trawling restricted</del> <del>7 : entry prohibited</del> 8 : entry restricted 9 : dredging prohibited <del>10 : dredging restricted</del> 11 : diving prohibited 12 : diving restricted 13 : no wake 14 : area to be avoided <del>15 : construction prohibited</del> 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited <del>19 : industrial or mineral exploration/development restricted</del> 20 : drilling prohibited <del>21 : drilling restricted</del> <del>22 : removal of historical artefacts prohibited</del> 23 : cargo transshipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 26 : landing prohibited 27 : speed restricted <del>28 : swimming prohibited</del>		
Status	(STATUS)	1 : permanent 4 : not in use 7 : temporary 12 : illuminated	EN	0,*
Vertical length	(VERLEN)		RE	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
INT 1 Reference: D 29; L 40.1, 41.1, 42, 44 <b>14.4.1 Pipelines, submarine or on land (see S-4 – B-377; B-444; B-444.1-2; B-444.4-5 and B-444.7)</b> Submarine pipelines can be divided into two main categories: <ul style="list-style-type: none"> <li>Oil, chemical, gas and water supply pipelines are an important feature of many areas. The pipes are generally encased in concrete for protection and to give them negative buoyancy, which can significantly increase their external diameter. Pipelines are generally laid directly on the seabed, with sections over local dips or hollows being supported physically from beneath. In some cases (e.g. in shallow water or near the</li> </ul>				

Comment [j90]: S-57  
Extension 06/01.

shore), where the external diameter of the pipeline would represent a significant reduction in the water depth above it, the pipelines may be laid in trenches and possibly buried.

In all cases it must be assumed that the pipes are vulnerable to damage from anchoring or trawling, although in a few cases concrete domes are used to protect particularly vulnerable junctions. Gas pipes present a severe hazard to ships damaging them (by fire, explosion, or possibly loss of buoyancy). Oil and chemical pipes are a danger to the environment if fractured. Damage to water pipes supplying residential areas, mainly islands, results in disruption or contamination of the water supply. In the above cases, submarine pipelines must be encoded on all appropriate maximum display scale ENC datasets.

- Outfalls and intakes such as sewers, and cooling water intakes, are mainly a feature of inshore waters. For small craft, in particular, such pipes are a potential danger to navigation. The pipes are also vulnerable to damage. They should be encoded on at least the largest maximum display scale ENC datasets.

If it is required to encode a submarine or land pipeline, it must be done using the **feature Pipeline Submarine/On Land**.

Remarks:

- If the buried depth varies along a submerged pipeline, the cable must be encoded as several features.
- The attributes **depth range minimum value** and **depth range maximum value** are used to encode the shallowest end deepest depth over the pipeline.
- Where a pipeline is disused, it should be encoded with the attribute **status** = 4 (not in use), and the attributes **category of pipeline/pipe** and **product** should not be encoded.
- Submarine pipes, buried so deep that they are not vulnerable to damage from anchoring, should not be encoded (so that mariners are not unnecessarily inhibited from anchoring or fishing). In marginal cases they may be encoded as **Pipeline Submarine/On Land** with the nominal depth to which they are buried encoded using the attribute **buried depth**.
- Buried pipelines on land should not be encoded.

#### 14.4.2 Diffusers, cribs

If it is required to encode diffusers and cribs, this must be done using **Obstruction features** (see clause X.X), with attribute **category of obstruction** = 3 (diffuser) or 4 (crib).

Distinction: Pipeline area; pipeline, overhead.

## 14.5 Submarine pipeline area

IHO Definition: <b>SUBMARINE PIPELINE AREA.</b> An area containing one or more submarine pipelines. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.118, November 2000).				
<b>S-101 Geo Feature:</b> Submarine pipeline area (PIPARE)				
<b>Primitives:</b> Point, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of pipeline/pipe	(CATPIP)	2 : outfall pipe 3 : intake pipe 4 : sewer 5 : bubbler system 6 : supply pipe	EN	0,*
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,0
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Product	(PRODCT)	1 : oil 2 : gas 3 : water 7 : chemicals 8 : drinking water 18 : liquefied natural gas (LNG) 19 : liquefied petroleum gas (LPG) 20 : wine	EN	0,*
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 7 : entry prohibited 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 14 : area to be avoided 15 : construction prohibited 16 : discharging prohibited 17 : discharging restricted	EN	0,*



		18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transshipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 26 : landing prohibited 28 : swimming prohibited		
Status	(STATUS)	1 : permanent 4 : not in use 7 : temporary	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><b>INT 1 Reference:</b> L 40.2, 41.2</p> <p><b>14.5.1 Submarine pipeline areas (see S-4 – B-439.3 and B-444.3)</b></p> <p>Submarine pipeline areas should be encoded where:</p> <ul style="list-style-type: none"> <li>pipelines (including disused pipelines) are so numerous in an area that it would be impossible to encode them individually without impairing the legibility of the ENC; or</li> <li>a regulatory authority designates an area for the protection of a pipeline, or pipelines.</li> </ul> <p>If it is required to encode a pipeline area, it must be done using the <b>feature Submarine Pipeline Area</b>.</p> <p><b>Remarks:</b></p> <ul style="list-style-type: none"> <li>Where populated, the attribute <b>status</b> must only be used to encode the status of the area and not the status of the pipelines in the area.</li> <li>The outer limits of a pipeline area must correspond to the area in which anchoring, trawling and dredging are prohibited or inadvisable, i.e., the limits must lie at a safe distance beyond the actual lines of the outermost pipes.</li> <li>Where a pipeline area is disused, the <b>Submarine Pipeline Area</b> should be encoded with the attribute <b>Status = 4</b> (not in use), and the attributes <b>category of pipeline/pipe</b> and <b>product</b> should not be encoded.</li> </ul> <p><b>Distinction:</b> Pipeline, overhead; pipeline, submarine/on land.</p>				

Comment [J91]: S-57  
Extension 06/01

## 14.6 Offshore production area

IHO Definition: <b>OFFSHORE PRODUCTION AREA.</b> An area at sea within which there are production facilities. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.113, November 2000).				
<b>S-101 Geo Feature: Offshore production area (OSPARE)</b>				
<b>Primitives:</b> Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of production area	(CATPRA)	1 : quarry 2 : mine 5 : refinery area 8 : tank farm 9 : wind farm	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined <del>3 : under reclamation</del> 4 : wingless 5 : planned construction	EN	0,1
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DE	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DE	0,1
Periodic			(S) BO	0,0
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
Product	(PRODCT)	1 : oil 2 : gas 4 : stone 6 : ore 10 : bauxite 14 : sand	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 7 : entry prohibited 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted	EN	0,*

		13 : no wake 14 : area to be avoided 15 : construction prohibited 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transshipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 26 : landing prohibited 28 : swimming prohibited		
Status	(STATUS)	1 : permanent 4 : not in use 7 : temporary 8 : private 12 : illuminated 19 : buoyed	EN	0,*
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

**Comment [j92]:** S-57  
Extension 06/01.

**Comment [j93]:** S-57  
Extension 06/01.

**INT 1 Reference:** L 4, 5.2

#### 14.6.1 Offshore production areas (see S-4 – B-445.3; B-445.9; B-445.11 and B-445.12)

Oil and gas fields are exploited in many parts of the world. Although the basic methods for extracting oil and gas are well established, details of the systems and structures may vary with the characteristics of the different fields and are continually being developed. In a typical field, oil or gas is obtained from wells drilled from fixed production platforms, usually standing on the seabed. From each production platform, the oil or gas is carried in pipes to a facilities platform where primary processing, compression and pumping are carried out. The oil or gas is then transported through pipelines to a nearby storage tank, tanker loading buoy or floating terminal, or direct to a tank farm on shore. One facilities platform may collect the oil or gas from several production platforms, and may supply a number of tanker loading buoys or storage units. Such facilities platforms are sometimes termed Field Terminal Platforms. Converted tankers or purpose-built vessels are often

permanently moored and used as facilities platforms, floating terminals, and for storage.

Other offshore energy production facilities include wind turbines and underwater current turbines. Other methods of harnessing tidal and wave energy are also in use.

If it is required to encode an offshore production area, it must be done using the **feature Offshore Production Area**.

**Remarks:**

- If it is required to encode an offshore wind farm, it should be done using an **Offshore Production Area feature**, with attribute **category of production area** = 9 (*wind farm*). General information about the wind farm such as blade diameter and blade vertical clearance should be encoded, if required, using the **complex attributes information** or **textual description**. If it is required to encode individual offshore wind turbines, it should be done using a **Landmark feature** of type point (see clause X.X), with attribute **category of landmark** = 19 (*windmotor*). Where a **Landmark** is encoded, an ECDIS Base Display **feature** (e.g. **Pile, Land Area**) must also be encoded coincident to ensure the feature is always displayed on the ECDIS. Where fitted, lights should be encoded as described in clause X.X, with the **Landmark** being used as the structure **feature** for the **Light** equipment **feature(s)** (see clause X.X). The extent and nature of any restricted area related to the wind turbine should be encoded using a **Restricted Area feature** (see clause X.X).
- If it is required to encode a wave or current farm (or turbine field) for generating electricity from waves or tidal currents, it should be done using an **Offshore Production Area feature**, with no value populated for **category of production area** and **complex attribute information (sub-attribute text)** = *Wave farm or Current farm*. If it is required to encode individual wave energy devices or underwater turbines, it should be done using an **Obstruction** object (see clause 6.2.2) or, if there are associated surface structures, using appropriate **features**, e.g. **Offshore Platform** or **Beacon Special Purpose/General** (see clauses X.X and X.X), with **information (sub-attribute text)** = *Wave energy device* or *Underwater turbine*. The extent and nature of any restricted area related to the feature should be encoded using a **Restricted Area feature** (see clause X.X).

#### 14.6.2 Offshore tanker loading systems (see S-4 – B-445.4)

Although the oil and gas from some fields are sent ashore by submarine pipeline, a variety of mooring systems have been developed for use in deep water and in the vicinity of certain ports, to allow the loading of large vessels and the permanent mooring of floating storage vessels or units. These offshore systems include large mooring buoys, designed for mooring vessels up to 500,000 tonnes, and platforms on structures fixed at their lower ends to the sea floor. They allow a vessel to moor forward or aft to them, and to swing to the wind or stream. Those which are fixed are termed Single Point Moorings (SPM). Those which are a form of mooring buoy are termed Single Buoy Moorings (SBM). Like production platforms, SPM and SBM normally have lights and fog signals.

If it is required to encode an offshore tanker loading system, it must be done using the **feature Buoy Installation** (see clause X.X).

If it is required to encode an articulated tower, it must be done using an **Offshore Platform feature** (see clause X.X), with attribute:

- category of offshore platform** - 4 - articulated loading platform (ALP)  
 5 - single anchor leg mooring (SALM)  
 8 - floating production, storage and off-loading vessel (FPSO)  
 10 - navigation, communication and control buoy (NCCB) (which may include storage facilities)

**Distinction:** Offshore platform; Exclusive Economic Zone.

## 15 Tracks and Routes

### 15.1 Leading, clearing and transit lines and recommended tracks (see S-4 – B-433 and B-434)

If it is required to encode leading, clearing and transit lines and recommended tracks, it must be done using the features **Navigation Line** and **Recommended Track** (see clauses X.X and X.X), and related point navigational aids features (see section XX). This applies for visual and radio navigational aids.

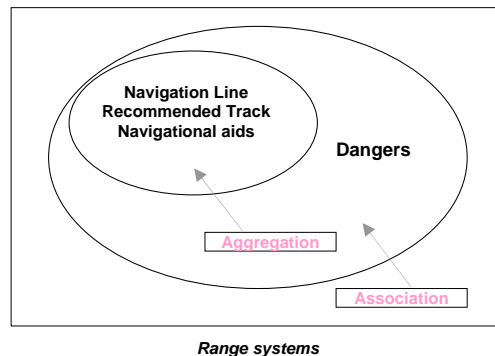
Relationships should be defined between these features (see clauses X.X and X.X).

NB. In North America the word “range” is used instead of “transit” and “leading line”.

#### 15.1.1 Range systems - relationship

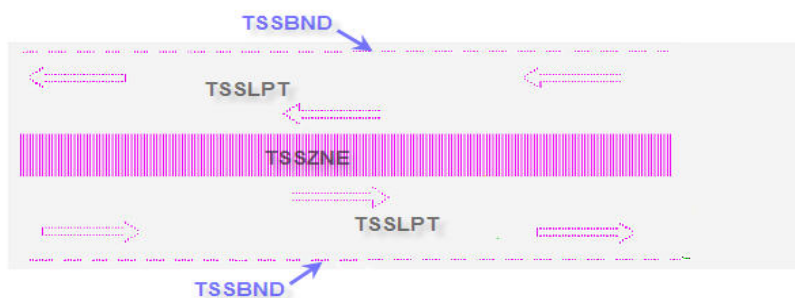
To encode a range system, the features **Navigation Line**, **Recommended Track** and the navigational aids features should be aggregated using a collection feature **C\_AGGR** (see clause X.X).

This aggregation feature may also be associated, using a collection feature **C ASSO** (see clause X.X), with the dangers (e.g. **Obstruction**, **Wreck**, **Underwater/Awash Rock** features) marked by the clearing or transit line.



### 15.2 Traffic Lanes

A traffic lane is an area within defined limits in which one-way traffic is established. Arrows are shown in the traffic lanes to indicate the direction of traffic flow. These lanes of travel are composed of the following objects: **Traffic Separation Scheme Lane Part** and **Deep Water Route Part**.



Traffic Lanes - Example

### 15.3 Traffic separation schemes and traffic separation scheme systems

A traffic separation scheme is a routing measure which separates opposing streams of marine traffic by the establishment of separation zones or lines and traffic lanes. It may include inshore traffic zones or Deep Water routes. A separation zone or line separates:

- 1) The traffic lanes in which ships are proceeding in opposite or nearly opposite directions,
- 2) Separates a traffic lane from the adjacent sea area, or

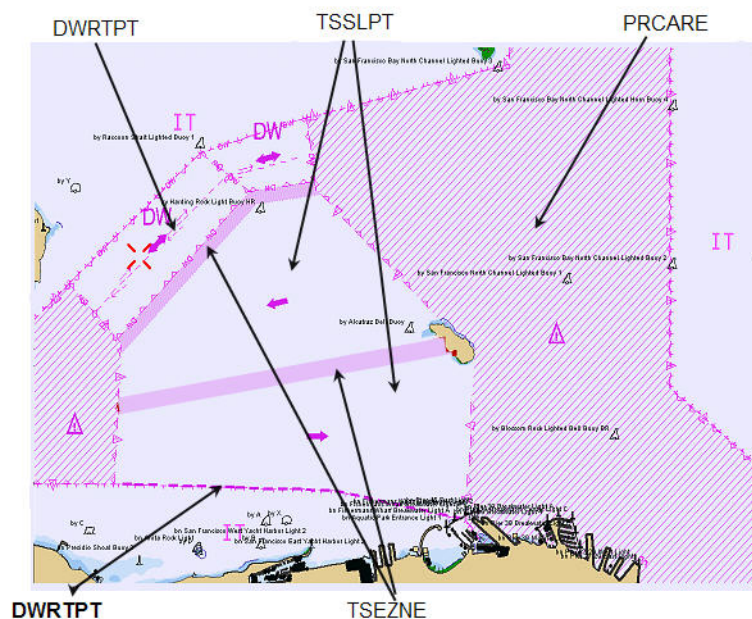
### 3) Separates traffic lanes designated for particular classes of ships proceeding in the same direction.

If it is required to encode a traffic separation scheme, it must be done using **Deep Water Route Centreline**, **Deep Water Route Part**, **Inshore Traffic Zone**, **Precautionary Area**, **Traffic Separation Line**, **Traffic Separation Zone**, **Traffic Separation Scheme Boundary**, **Traffic Separation Scheme Crossing**, **Traffic Separation Scheme Lane Part**, **Traffic Separation Scheme Roundabout** features, and navigational aids features.

The encoding of relationships between these objects is defined in clause X.X.

For guidance on provision of advance notification of changes to traffic separation schemes, see clause X.X.

To encode a traffic separation scheme (TSS) system, the **Deep Water Route Centreline**, **Deep Water Route Part**, **Inshore Traffic Zone**, **Precautionary Area**, **Traffic Separation Line**, **Traffic Separation Zone**, **Traffic Separation Scheme Boundary**, **Traffic Separation Scheme Crossing**, **Traffic Separation Scheme Lane Part**, **Traffic Separation Scheme Roundabout** features, and the navigational aids features (if they are stated in the regulation defining the TSS or **Deep Water route**), must be aggregated using the collection feature **C\_AGGR** (see clause X.X). Where it is required to indicate the name of the complete aggregated TSS, this should be done using a **Sea Area/Named Water Area** feature (see clause X.X), or by populating the complex attribute feature name for the most representative feature in the TSS. Where it is required to populate textual information for the TSS, this should be done using a **Nautical Publication Information** feature (see clauses X.X), with complex attributes **information** and/or **textual description** (see clause X.X), or if the information is considered essential for safe navigation, using a **Caution Area** feature (see clause X.X).



Sample Traffic Separation Scheme (TSS) and Deep Water route (DW)

#### Remarks:

- Traffic separation scheme systems may be included with other routing measures such as Deep Water or two-way routes, or another traffic separation scheme system, to comprise a complete traffic routing system. To encode the relationship between routing measures, the **C\_AGGR** defining each routing measure within the system (or the relevant feature if the routing measure consists of a single feature) may be aggregated using **C\_AGGR** to form a hierarchical relationship (see clause X.X). The individual elements comprising different routing measures must not be aggregated into a single **C\_AGGR**.

## 15.4 Navigation line

**IHO Definition:** **NAVIGATION LINE.** A straight line extending towards an area of navigational interest and generally generated by two navigational aids or one navigational aid and a bearing. (Service Hydrographique et Oceanographique de la Marine, France).

**S-101 Geo Feature:** Navigation line (NAVLNE)

**Primitives:** Curve

Real World		Paper Chart Symbol	ECDIS Symbol		
S-101 Attribute		S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of navigation line		(CATNAV)	1 : clearing line 2 : transit line 3 : leading line bearing a recommended track	EN	1,1
Date range				C	0,2
Date end			ISO 8601:1988	(S) DA	0,1
Date start			ISO 8601:1988	(S) DA	0,1
Periodic				(S) BO	0,1
Orientation		(ORIENT)		RE	1,1
Status		(STATUS)	1 : permanent 2 : occasional 5 : periodic/intermittent 7 : temporary 8 : private 14 : public	EN	0,*
Information				C	0,*
Language			ISO 639-3	(S) TE	0,1
Text		(INFORM)		(S) TE	1,1
Textual description				C	0,*
File reference		(TXTDSC)		(S) TE	1,1
Language			ISO 639-3	(S) TE	0,1
Scale minimum		(SCAMIN)		IN	0,1
Recording date		(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication		(RECIND)		TE	0,1
Source indication				C	0,*
Authority				(S) TE	1,1
Nationality				(S) TE	1,1
ID code				(S) TE	0,1
Source				(S) TE	0,1
Source date		(SORDAT)	ISO 8601:1988	(S) DA	1,1

**INT 1 Reference:** M 1-2; Q 122

### 15.4.1 Navigation lines (see S-4 – B-433)

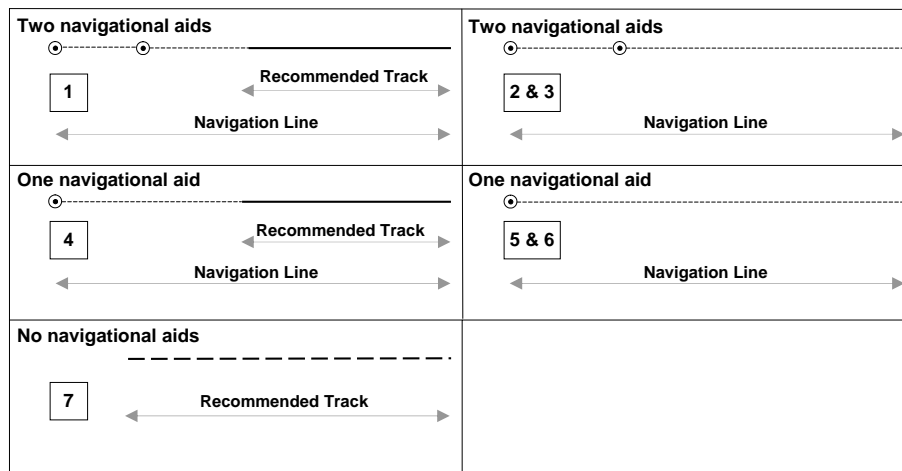
Clearing Lines are important in rocky areas where dangers are not guarded by buoys and where sailing vessels (which are not always able to keep to a direct track) and other small craft may navigate close inshore.

Transits marking isolated dangers are based on beacons or other marks which are erected on shore to indicate (approximately, unless there are two pairs of beacons) the position of an isolated danger. Leading lines based on beacons or lights must be encoded where the maximum display scale for the ENC data permits. Leading lines based on natural objects should be encoded on the largest maximum display scale ENC data where they appear to be useful, particularly if other navigational aids seem inadequate.

If it is required to encode a navigation line, it must be done using the **feature Navigation Line**.

The use of **Navigation Line** and **Recommended Track** (see clause X.X) is defined in more detail in the following Table, and in the Figure below:

Figure		Navigation Line	Recommended Track	Navigational Aids
1	Recommended track on a leading line	category of navigation line = 3	category of recommended track = 1	at least 2
2	Clearing line on marks in line	category of navigation line = 1	none	at least 2
3	Transit line on marks in line	category of navigation line = 2	none	at least 2
4	Recommended track on a bearing	category of navigation line = 3	category of recommended track = 1	1
5	Clearing line on a bearing	category of navigation line = 1	none	1
6	Transit line on a bearing	category of navigation line = 2	none	1
7	Recommended track not based on fixed marks	none	category of recommended track = 2	none



#### Remarks:

- The value populated for the mandatory attribute **orientation** must be the value of the bearing from seaward.
- The extent of the navigation line depends on the visibility of the navigational aids.
- The recommended track is that portion of a navigation line that a ship should use for navigation.

#### 15.4.2 Measured distances (see S-4 – B-458)

If the track to be followed is on a leading line or a bearing, it must be encoded in the way described in the Table and Figure above (cases 1 or 4). If the track is not on a leading line or bearing, it must be encoded only as a **Navigation Line** feature with the attribute **category of navigation line** being set to an empty (null) value. In either case, if it is required to encode the measured distance, it must be done using the attribute **information** (e.g. *Measured distance = 1450 metres*).



If it is required to encode the transit lines, they must be done using **Navigation Line features**, with **category of navigation line = 2** (transit line).

If it is required to encode the beacons, they must be done using **Beacon Special Purpose/General features**, with attribute **category of special purpose mark = 17** (measured distance mark).

On occasions, one or more of the transits used for the measured distance may incorporate an existing landmark as the front or rear mark. In this case, if **Landmark** is encoded, **category of special purpose mark = 17** must also be populated.

Where the entire measured distance system exists within a single **dataset**, each transit line with its beacons must be aggregated into a collection **feature C\_AGGR** (see clause **X.X**). These two aggregation **features** and the track to be followed must be aggregated into another **C\_AGGR feature**.

Remarks:

Distinction: Recommended route; recommended track.

Comment [j94]: MD8 –  
8.Co.1(???)

## 15.5 Recommended track

IHO Definition: <b>RECOMMENDED TRACK</b> . A track recommended to all or only certain vessels. (IHO Dictionary – S-32).				
<b>S-101 Geo Feature: Recommended track (RECTRC)</b>				
<b>Primitives:</b> Curve, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of recommended track	(CATTRK)	1 : based on a system of fixed marks 2 : not based on a system of fixed marks	EN	1,1
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Depth range minimum value	(DRVAL1)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Maximum authorised draught			RE	1,1
Orientation	(ORIENT)		RE	1,1
Quality of sounding measurement	(QUASOU)	1 : depth known 2 : depth <b>or least depth</b> unknown <del>3 : doubtful sounding</del> <del>4 : unreliable sounding</del> 6 : least depth known	EN	0,*
Sounding uncertainty	(SOUACC)		RE	0,1
Status	(STATUS)	1 : permanent 2 : occasional 5 : periodic/intermittent 7 : temporary 9 : mandatory 12 : illuminated 16 : watched 17 : un-watched	EN	0,*
Technique of sounding measurement	(TECSOU)	1 : found by echo-sounder 2 : found by side scan sonar 3 : found by multi-beam 6 : swept by wire-drag 7 : found by laser 8 : swept by vertical acoustic system	EN	0,*

Comment [j95]: MD8 – 4.Co.11 and 4.Cl.9.

		9 : found by electromagnetic sensor 11 : satellite imagery 13 : swept by side-scan sonar		
Traffic	(TRAFIC)	1 : inbound 2 : outbound 3 : one-way 4 : two-way	EN	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

**INT 1 Reference:** M 3-6

#### 15.5.1 Recommended tracks (see S-4 – B-432.1; B-434 and B-434.1-4)

Recommended tracks and fairways usually comprise a number of sections (sometimes termed “legs”) which lead between dangers lying close on both sides of the track or fairway. Tracks commonly include some sections which are leading lines (see clause X.X). The distinction between tracks and fairways, in this context, is that tracks have no specified outer limits and fairways do have specified outer limits.

It is important to recognise that it is not the role of cartographers to create “recommended” tracks and other “recommended” routing measures; such recommendations are made by other authorities. The word “Recommended”, used in connection with recommended tracks and other recommended routing measures usually implies that it has been recommended by a competent authority (such as a port authority within its port limits or a maritime safety authority) and may be adopted by IMO. Occasionally, the recommendation may be based on advice directly from a competent surveyor or established by precedent.

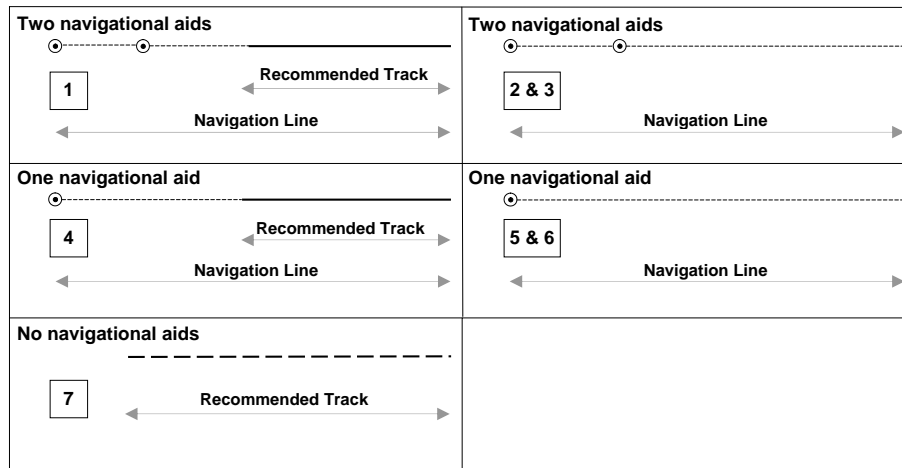
Recommended tracks include all channels recommended for hydrographic reasons to lead safely between shoal depths. The use of such tracks is generally left to the discretion of the mariner and will depend on the vessel's draught, the state of the tide, adequacy of navigational aids and so on.

If it is required to encode a recommended track, it must be done using the **feature Recommended Track**.

The use of **Navigation Line** and **Recommended Track** is defined in more detail in the following Table, and in the Figure below.

Figure		Navigation Line	Recommended Track	Navigational Aids
1	Recommended track on a leading line	category of navigation line = 3	category of recommended track = 1	at least 2
2	Clearing line on marks in line	category of navigation line = 1	none	at least 2

3	Transit line on marks in line	category of navigation line = 2	none	at least 2
4	Recommended track on a bearing	category of navigation line = 3	category of recommended track = 1	1
5	Clearing line on a bearing	category of navigation line = 1	none	1
6	Transit line on a bearing	category of navigation line = 2	none	1
7	Recommended track not based on fixed marks	none	category of recommended track = 2	none



#### Remarks:

- The attribute **depth range minimum value** is used to encode the shallowest depth along the track, where required.
- The attribute **maximum authorised draught** is used to encode the maximum draught permitted on the track, where required.
- The **recommended track** is that portion of a navigation line (see clause X.X) that a ship should use for navigation (see Figure above).
- In the case of a two-way recommended track, only one value of orientation is encoded (in the attribute **orientation**); the other value can be deduced (i.e. the value in **orientation** + 180 degrees). The value of orientation encoded on the attribute **orientation** should be the value of the bearing from seaward. If it is not possible to define a seaward direction, the value that is less than 180° should be used.
- When the traffic flow along a recommended track is one way (attribute **traffic** = 1, 2 or 3), the direction of digitising of the **Recommended Track** must be the same as the direction of the traffic flow, in order to ensure the correct representation in the ECDIS of the direction to be followed.

Distinction: Fairway; navigation line; recommended route centreline; recommended traffic lane part.

## 15.6 Fairways

**IHO Definition: FAIRWAY.** That part of a river, harbour and so on, where the main navigable channel for vessels of larger size lies. It is also the usual course followed by vessels entering or leaving harbours, called "ship channel". (International Maritime Dictionary, 2<sup>nd</sup> Edition).

### **S-101 Geo Feature: Fairway (FAIRWY)**

**Primitives:** Surface

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,0
Depth range minimum value	(DRVAL1)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Orientation	(ORIENT)		RE	0,1
Quality of sounding measurement	(QUASOU)	1 : depth known 2 : depth or least depth unknown <del>3 : doubtful sounding</del> <del>4 : unreliable sounding</del> 6 : least depth known	EN	0,*
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 15 : construction prohibited 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited	EN	0,*

**Comment [J96]:** MD8 – 4.Co.11 and 4.Cl.9.

		21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transhipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 27 : speed restricted 28 : swimming prohibited		
Sounding uncertainty	(SOUACC)		RE	0,1
Status	(STATUS)	1 : permanent 3 : recommended 6 : reserved 7 : temporary 9 : mandatory 19 : buoyed	EN	0,*
Traffic	(TRAFIC)	1 : inbound 2 : outbound 3 : one-way 4 : two-way	EN	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><b>INT 1 Reference:</b> M 18</p> <p><b>15.6.1 Fairways (see S-4 – B-432.1(c) and B-434.5)</b></p> <p>A fairway, sometimes called Ship Channel, is the main navigable channel in the approaches to, or within, a river or harbour. Fairways which are designated by a regulatory authority are treated as Routeing Measures.</p> <p>If it is required to encode a fairway, it must be done using the <b>feature Fairway</b>.</p> <p><b>Remarks:</b></p> <ul style="list-style-type: none"> <li>The attribute <b>depth range minimum value</b> is used to encode the shallowest depth in the fairway, where known.</li> <li>A collection feature <b>C_AGGR</b> or <b>C_ASSO</b> (see clause XX) should be created to relate a fairway with associated navigational aids, recommended tracks, dredged areas and other regulated areas.</li> <li>Where beacons or buoys marking a fairway are offset from the actual fairway limits, this should be indicated using the <b>complex</b> attribute <b>information</b> on the <b>Fairway</b> feature.</li> </ul> <p><b>Distinction:</b> Deep Water route centreline; Deep Water route part; traffic separation scheme lane part.</p>				

**Comment [j97]:** S-57  
Extension 06/01.

**Comment [j98]:** S-57  
Extension 06/01.

## 15.7 Recommended routes

**IHO Definition: RECOMMENDED ROUTE CENTRELINE.** A recommended route is a route of undefined width, for the convenience of ships in transit, which is often marked by centreline buoys. (IHO Dictionary – S-32).

The recommended route centreline indicates the "centreline" of a recommended route. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.137, November 2000).

### **S-101 Geo Feature: Recommended route centreline (RCRTCL)**

**Primitives:** Curve

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of recommended track	(CATTRK)	1 : based on a system of fixed marks 2 : not based on a system of fixed marks	EN	1,1
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Depth range minimum value	(DRVAL1)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Orientation	(ORIENT)		RE	0,1
Quality of sounding measurement	(QUASOU)	1 : depth known 2 : depth or least depth unknown 3 : doubtful sounding 4 : unreliable sounding 6 : least depth known	EN	0,*
Sounding uncertainty	(SOUACC)		RE	0,1
Status	(STATUS)	1 : permanent 5 : periodic/intermittent 6 : reserved 9 : mandatory	EN	0,*
Technique of sounding measurement	(TECSOU)	1 : found by echo-sounder 2 : found by side-scan sonar 3 : found by multi-beam 6 : swept by wire-drag 7 : found by laser 8 : swept by vertical acoustic system 9 : found by	EN	0,*

**Comment [j99]:** MD8 – 4.Co.11 and 4.Cl.9.

		electromagnetic sensor 11 : satellite imagery 13 : swept by side-scan sonar		
Traffic	(TRAFIC)	1 : inbound 2 : outbound 3 : one-way 4 : two-way	EN	0,1
Water level effect	(WATLEV)	1 : partly submerged at high water 2 : always dry 3 : always under water / submerged 4 : covers and uncovers 5 : awash 6 : subject to inundation or flooding	EN	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><u>INT 1 Reference:</u> M 28.1</p> <p><b>15.7.1 Recommended routes (see S-4 – B-435.4)</b></p> <p>IMO-designated recommended routes are listed in IMO publication “<i>Ships’ Routeing</i>” Part E. This type of routeing measure was adopted to include such features as the “transit routes” (through former minefields) in the entrances to the Baltic Sea. In contrast to recommended tracks (see clause X.X), there is usually ample sea-room for vessels to keep well starboard (to the right) of the centreline.</p> <p>If it is required to encode the centreline of a recommended route, it must be done using the <b>feature Recommended Route Centreline</b>.</p> <p><u>Remarks:</u></p> <ul style="list-style-type: none"> <li>• The attribute <b>depth range minimum value</b> is used to encode the shallowest depth on the route, where known.</li> <li>• In the case of a recommended route centreline, only one value of orientation is encoded (in the attribute <b>orientation</b>); the other value can be deduced (i.e. the value in <b>orientation</b> + 180 degrees). The value of orientation encoded on the attribute <b>orientation</b> should be the value of the bearing from seaward. If it is not possible to define a seaward direction, the value that is less than 180° should be used.</li> <li>• When the traffic flow is one way (attribute <b>traffic</b> = 1, 2 or 3), the direction of digitising must be the same as the direction of traffic flow, in order to ensure the correct representation in the ECDIS of the direction to be followed.</li> </ul> <p><u>Distinction:</u> Recommended track; recommended traffic lane part.</p>				



## 15.8 Two-way route part

**IHO Definition: TWO-WAY ROUTE PART.** A two way route is a route within defined limits inside which two way traffic is established, aimed at providing safe passage of ships through waters where navigation is difficult or dangerous. (IHO Dictionary – S-32).

A two-way route part is an area of a two-way route within which traffic flow is generally along one bearing (and possibly its reciprocal). (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.193, November 2000).

### **S-101 Geo Feature: Two-way route part (TWRTPT)**

**Primitives:** Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of recommended track	(CATTRK)	1 : based on a system of fixed marks 2 : not based on a system of fixed marks	EN	0,1
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,0
Depth range minimum value	(DRVAL1)		RE	0,1
Orientation	(ORIENT)		RE	1,1
Quality of sounding measurement	(QUASOU)	1 : depth known 2 : depth <del>or least depth</del> unknown 3 : doubtful sounding 4 : unreliable sounding 6 : least depth known	EN	0,*
Sounding uncertainty	(SOUACC)		RE	0,1
Status	(STATUS)	1 : permanent 3 : recommended 6 : reserved 9 : mandatory	EN	0,*
Technique of sounding measurement	(TECSOU)	1 : found by echo-sounder <del>2 : found by side-scan sonar</del> 3 : found by multi-beam 5 : found by lead-line 6 : swept by wire-drag 7 : found by laser 8 : swept by vertical acoustic system 9 : found by electromagnetic sensor 10 : photogrammetry 11 : satellite imagery 13 : swept by side-scan sonar	EN	0,*
Traffic	(TRAFIC)	1 : inbound 2 : outbound 3 : one-way	EN	1,1

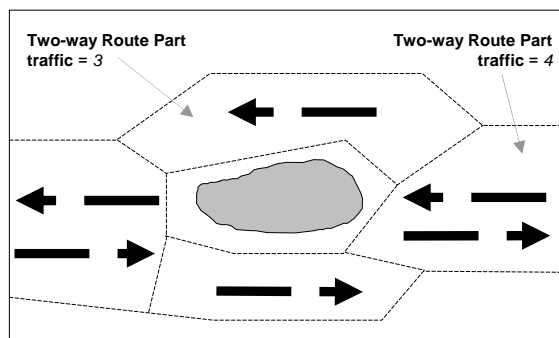
**Comment [j100]:** MD8 – 4.Co.11 and 4.Cl.9.

		4 : two-way		
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: M 28.2

#### 15.8.1 Two-way Routes (see S-4 – B-435.6)

A two-way route consists of one or more areas within which traffic flows in two directions along one bearing and/or its reciprocal. Such routes are established by regulatory authorities and may be adopted by IMO. IMO-designated two-way routes are listed in IMO publication "Ships' Routing" Part E. When it is required to encode these areas, this must be done using the feature **Two-way Route Part**. These route parts will generally be two-way, but some may be restricted to one-way traffic flow.



One-way traffic flow in a two-way route

If it is required to encode a two-way route with one-way sections, separate **Two-way Route Part** features must be encoded for the different parts, with attribute **traffic** = 3 (one-way) or 4 (two-way). In one-way sections, the attribute **orientation** must indicate the true direction of traffic flow, not its reciprocal. In two-way sections, **orientation** may indicate either direction of traffic flow.

#### Remarks:

- The orientation of the two-way route part is defined by the centreline of the part and is related to the general direction of the two-way route.
- The attribute **depth range minimum value** is used to encode the shallowest depth on the part, where required.
- To encode a complete two-way route, the **Two-way Route Part** features may be aggregated using the collection feature **C\_AGGR** (see clause X.X). Where it is required to indicate the name of an aggregated two-way route, this should be done using a **Sea Area/Named Water Area** feature (see clause X.X), or by populating **feature name** for the most representative feature in the two-way route. Where it is required to populate textual information for the two-way route, this should be done using a **Nautical Publication**

**Information feature** (see clauses X.X), with **complex** attributes **information** and/or **textual description** (see clause X.X), or if the information is considered essential for safe navigation, using a **Caution Area feature** (see clause X.X).

- Two-way routes may be included with other routeing measures such as traffic separation schemes to comprise a complete traffic routeing system. To encode the relationship between routeing measures, the **C\_AGGR** defining each routeing measure within the system (or the relevant **feature** if the routeing measure consists of a single **feature**) may be aggregated using **C\_AGGR** to form a hierarchical relationship (see clause X.X). The individual elements comprising different routeing measures must not be aggregated into a single **C\_AGGR**.

Distinction: Deep Water route part; recommended traffic lane part; traffic separation scheme lane part.

## 15.9 Recommended direction of traffic flow

**IHO Definition: RECOMMENDED TRAFFIC LANE PART.** Recommended direction of traffic flow is a traffic flow pattern indicating a recommended directional movement of traffic where it is impractical or unnecessary to adopt an established direction of traffic flow. (IHO Dictionary – S-32).

A recommended traffic lane part is an area of a recommended direction of traffic control area within which traffic flow is generally along one bearing.

**S-101 Geo Feature: Recommended traffic lane part (RCRTCL)**

**Primitives:** Point, Surface

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,0
Orientation	(ORIENT)		RE	1,1
Status	(STATUS)	1 : permanent 6 : reserved 9 : mandatory	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)		DA	0,1
Recording indication	(RECIND)	ISO 8601:1988	TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

**INT 1 Reference:** M 26.1-2

### 15.9.1 Recommended traffic lane part (see S-4 – B-435.5)

IMO-designated recommended directions of traffic flow are listed in IMO publication “Ships’ Routing” Part E. Several hydrographic offices, in consultation with their Ministries of Transport, have added recommended directions in areas such as the outer approaches to major ports in order to show the best routes for crossing traffic or to minimise the risk of head-on encounters.

The **feature Recommended Traffic Lane Part** **must** be used, **where required**, to encode areas with a

recommended direction of traffic flow which is generally along one bearing:

- between two TSS (INT1 – M 26.1);
- in the entrance area of a TSS; or
- along the outside of a Deep Water route (INT1 – M 26.2).

Remarks:

- When the area is not defined, a point feature should be encoded.
- The orientation of the recommended traffic lane part is defined by the centreline of the part and is related to the general direction of traffic flow in the recommended traffic lane.

Distinction:

### 15.10 Traffic separation scheme lane part

**IHO Definition:** **TRAFFIC SEPARATION SCHEME LANE PART.** A traffic separation scheme is a scheme which aims to reduce the risk of collision in congested and/or converging areas by separating traffic moving in opposite, or nearly opposite, directions. (IHO Dictionary – S-32).

A traffic lane is an area within defined limits in which one-way traffic flow is established. Natural obstacles, including those forming separation zones, may constitute a boundary. (IHO Dictionary – S-32).

A traffic separation scheme lane part is an area of a traffic lane in which the direction of flow of traffic is generally along one bearing. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.187, November 2000).

#### **S-101 Geo Feature: Traffic separation scheme lane part (TSSLPT)**

**Primitives:** Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of traffic separation scheme	(CATTSS)	1 : IMO – adopted 2 : not IMO – adopted	EN	0,1
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,0
Exposition of sounding	(EXPSOU)	1 : within the range of depth of the surrounding depth area 2 : shoaler than the range of depth of the surrounding depth area <del>3 : deeper than the range of depth of the surrounding depth area</del>	EN	0,1
Orientation	(ORIENT)		RE	0,1
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted	EN	0,*

		22 : removal of historical artefacts prohibited 23 : cargo transshipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 27 : speed restricted		
Status	(STATUS)	1 : permanent 3 : recommended 6 : reserved 9 : mandatory 19 : buoyed	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

**Comment [j101]:** S-57  
Extension 06/01.

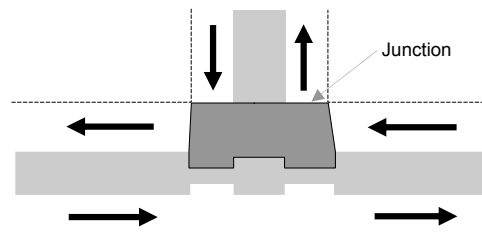
**INT 1 Reference:** M 20.1-3, 22

#### 15.10.1 Traffic separation scheme lanes (see S-4 – B-435.1)

A complete traffic separation scheme lane consists of one or more areas within which the flow of traffic follows one defined direction. If it is required to encode these areas, this must be done using the **feature Traffic Separation Scheme Lane Part**.

##### Remarks:

- The attribute **orientation** is mandatory for all **Traffic Separation Scheme Lane Part** features, unless the part is a junction.
- At junctions, other than crossings and roundabouts, a separate **Traffic Separation Scheme Lane Part** feature must be encoded. For this feature, the attribute **orientation** must be omitted, in order to avoid implying that one lane has priority over another (see INT1 – M22). Warning text may be encoded using the complex attributes **information** or **textual description**. In some cases, a precautionary area is established where routes meet or cross (see clause X.X).



- The orientation of the traffic separation scheme lane part is defined by the centreline of the part and is

related to the general direction of traffic flow in the traffic separation lane.

Distinction: Recommended traffic lane part; traffic separation line; traffic separation scheme boundary; traffic separation scheme crossing; traffic separation scheme roundabout; traffic separation zone.



## 15.11 Traffic separation zone

**IHO Definition:** **TRAFFIC SEPARATION ZONE.** A traffic separation scheme is a scheme which aims to reduce the risk of collision in congested and/or converging areas by separating traffic moving in opposite, or nearly opposite, directions. (IHO Dictionary – S-32).

A traffic separation zone is a zone separating the lanes in which ships are proceeding in opposite or nearly opposite directions; or separating traffic lanes designated for particular classes of ships proceeding in the same direction (IMO Ships Routing, 6<sup>th</sup> Edition).

### **S-101 Geo Feature:** Traffic separation zone (TSSZNE)

**Primitives:** Surface

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of traffic separation scheme	(CATSS)	1 : IMO – adopted 2 : not IMO – adopted	EN	0,1
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,0
Status	(STATUS)	1 : permanent 3 : recommended 9 : mandatory 19 : buoyed	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

**Comment [j102]:** S-57  
Extension 06/01.

**INT 1 Reference:** M 13, 20.1, 20.3, 21

#### **15.11.1 Traffic separation zones (see S-4 – B-435.1 and B-436.3)**

The **feature Traffic Separation Zone** must only be used to encode the separation areas between two traffic lanes, or of one traffic lane and one inshore traffic zone, or to encode the centre part of a roundabout.

**Remarks:**

- No remarks.

Distinction: Traffic separation line; traffic separation scheme boundary; traffic separation scheme crossing; traffic separation scheme lane part; traffic separation scheme roundabout.

## 15.12 Traffic separation scheme boundary

**IHO Definition:** **TRAFFIC SEPARATION SCHEME BOUNDARY.** A traffic separation scheme is a scheme which aims to reduce the risk of collision in congested and/or converging areas by separating traffic moving in opposite, or nearly opposite, directions. (IHO Dictionary – S-32).

The boundary of a traffic separation scheme is the outer limit of a traffic lane part or a traffic separation scheme roundabout. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.185, November 2000).

**S-101 Geo Feature:** Traffic separation scheme boundary (TSSBND)

**Primitives:** Point, Surface

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of traffic separation scheme	(CATTSS)	1 : IMO – adopted 2 : not IMO – adopted	EN	0,1
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,0
Status	(STATUS)	1 : permanent 3 : recommended 9 : mandatory 19 : buoyed	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

**Comment [j103]:** S-57  
Extension 06/01.

**INT 1 Reference:** M 15

### 15.12.1 Traffic separation scheme boundaries (see S-4 – B-435.1)

The **feature Traffic Separation Scheme Boundary** must only be used to encode the outer limits of traffic lanes or traffic separation scheme roundabouts.

**Remarks:**

- **Traffic Separation Scheme Boundary** must not be used to encode the boundary between a traffic

separation scheme lane or roundabout and a traffic separation zone; or a traffic separation zone and an inshore traffic zone.

Distinction: Traffic separation line; traffic separation scheme crossing; traffic separation scheme lane part; traffic separation scheme roundabout; traffic separation zone.

### 15.13 Precautionary area

<b>IHO Definition:</b> <b>PRECAUTIONARY AREA.</b> A routing measure comprising an area within defined limits where ships must navigate with particular caution and within which the direction of traffic flow may be recommended. (IHO Dictionary – S-32).				
<b>S-101 Geo Feature:</b> Precautionary area (PRCARE)				
<b>Primitives:</b> Point, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
<b>S-101 Attribute</b>	<b>S-57 Acronym</b>	<b>Allowable Encoding Value</b>	<b>Type</b>	<b>Multiplicity</b>
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,0
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 14 : area to be avoided 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transshipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 27 : speed restricted	EN	0,*
Status	(STATUS)	1 : permanent 9 : mandatory 19 : buoyed	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1

**Comment [j104]:** S-57  
Extension 06/01.

Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: M 16, 24

#### 15.13.1 Precautionary areas (see S-4 – B-435.2)

Precautionary areas are commonly designated by IMO for certain areas of converging or crossing traffic, usually in association with traffic separation schemes.

The **feature Precautionary Area** must only be used to encode an area, within defined limits, where ships must navigate with particular caution, and within which the direction of traffic flow may be recommended.

#### Remarks:

- At least one of the complex attributes **information** or **textual description** must be used to encode the relevant cautionary information.
- A **Precautionary Area feature** may overlap other **features** encoded for the traffic separation scheme (e.g. **Traffic Separation Scheme Roundabout**, **Traffic Separation Scheme Lane Part**, **Traffic Separation Scheme Crossing**).

Distinction: Caution area; inshore traffic zone; restricted area; **all traffic separation scheme elements of type area**.

## 15.14 Deep water route centreline

**IHO Definition: DEEP WATER ROUTE CENTRELINE.** A Deep Water route is a route in a designated area, within defined limits, which has been accurately surveyed for clearance of sea bottom and submerged obstacles to a minimum indicated depth of water. (IHO Dictionary – S-32).

The Deep Water route centreline indicates the centreline of a route, the width of which is not explicitly defined. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.49, November 2000).

**S-101 Geo Feature:** Deep water route centerline (DWRCTL)

**Primitives:** Curve

Real World	Paper Chart Symbol	ECDIS Symbol		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of recommended track	(CATTRK)	1 : based on a system of fixed marks 2 : not based on a system of fixed marks	EN	1,1
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,0
Depth range minimum value	(DRVAL1)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Orientation	(ORIENT)		RE	1,1
Quality of sounding measurement	(QUASOU)	1 : depth known 2 : depth or least depth unknown 3 : doubtful sounding 4 : unreliable sounding 6 : least depth known 7 : least depth unknown, safe clearance at value shown	EN	0,*
Sounding uncertainty	(SOUACC)		RE	0,1
Status	(STATUS)	1 : permanent 3 : recommended 6 : reserved 9 : mandatory	EN	0,*
Technique of sounding measurement	(TECSOU)	1 : found by echo-sounder 2 : found by side scan sonar 3 : found by multi-beam 5 : found by lead-line 6 : swept by wire-drag 7 : found by laser	EN	0,*

**Comment [j105]:** MD8 – 4.Co.11 and 4.Cl.9.

		8 : swept by vertical acoustic system 9 : found by electromagnetic sensor 11 : satellite imagery 13 : swept by side-scan sonar		
Traffic	(TRAFIC)	1 : inbound 2 : outbound 3 : one-way 4 : two-way	EN	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: M 27.3

#### 15.14.1 Deep Water routes centrelines (see S-4 – B-435.3)

A complete Deep Water route (DW) consists of one or more areas within which the flow of traffic either follows one defined direction for one-way traffic, or follows one defined direction and its reciprocal for two-way traffic.

If it is required to encode the centreline of a Deep Water route, the width of which is not explicitly defined, it must be done using the **feature Deep Water Route Centreline**.

#### Remarks:

- In the case of a deep water route centreline, only one value of orientation is encoded (in the attribute **orientation**); the other value can be deduced (i.e. the value in **orientation** + 180 degrees). The value of orientation encoded on the attribute **orientation** should be the value of the bearing from seaward. If it is not possible to define a seaward direction, the value that is less than 180° should be used.
- When the traffic flow is one way (attribute **traffic** = 1, 2 or 3), the direction of digitising must be the same as the direction of traffic flow, in order to ensure the correct representation in the ECDIS of the direction to be followed.
- The complex attribute **feature name** should only be used if the individual feature is not aggregated in a collection feature or is the most representative feature in a collection feature (see clause X.X).
- To encode a complete Deep Water route, the **Deep Water Route Centreline**, **Deep Water Route Part features**, and the navigational aids **features** (if they are stated in the regulation defining the DW), may be aggregated using the collection **feature C\_AGGR** (see clause X.X). Where it is required to indicate the name of an aggregated DW, this should be done using a **Sea Area/Named Water Area feature** (see clause X.X), or by populating **feature name** for the most representative **feature** in the DW. Where it is required to populate textual information for the DW, this should be done using a **Nautical Publication Information feature** (see clauses X.X), with **complex** attributes **information** and/or **textual description** (see clause X.X), or if the information is considered essential for safe navigation, using a **Caution Area feature** (see clause X.X).
- Deep Water routes, unlike dredged areas, are likely to be designated in offshore waters outside the immediate supervision of harbour authorities (although some do form the outer approaches to deep water



ports). No least depth quoted can be fully guaranteed in most cases. Normally, least depths within the route must be encoded by soundings as elsewhere on the ENC dataset so that the navigator will not assume that the depths are continually monitored. However, in those cases where a hydrographic authority feels confident to guarantee the existence of a minimum depth of water in a DW route, it must be populated using the attribute **depth range minimum value**.

- Deep water routes may be included with other routeing measures such as traffic separation schemes to comprise a complete traffic routeing system. To encode the relationship between routeing measures, the **C\_AGGR** defining each routeing measure within the system (or the relevant **feature** if the routeing measure consists of a single **feature**) may be aggregated using **C\_AGGR** to form a hierarchical relationship (see clause **X.X**). The individual elements comprising different routeing measures must not be aggregated into a single **C\_AGGR**.
- IMO-designated Deep Water routes are listed in IMO publication "*Ships' Routeing*" Part C.

Distinction: Deep Water route part.

### 15.15 Deep water route part

**IHO Definition: DEEP WATER ROUTE PART.** A Deep Water route is a route in a designated area, within defined limits, which has been accurately surveyed for clearance of sea bottom and submerged obstacles to a minimum indicated depth of water. (IHO Dictionary – S-32).

A Deep Water route part is an area of a Deep Water route in which the direction of flow of traffic is uniform.

#### **S-101 Geo Feature: Deep water route part (DWRTPT)**

**Primitives:** Surface

Real World

Paper Chart Symbol

ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,0
Depth range minimum value	(DRVAL1)		RE	1,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Orientation	(ORIENT)		RE	1,1
Quality of sounding measurement	(QUASOU)	1 : depth known 2 : depth or least depth unknown 3 : doubtful sounding 4 : unreliable sounding 6 : least depth known 7 : least depth unknown, safe clearance at value shown	EN	0,*
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 14 : area to be avoided 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited	EN	0,*

**Comment [j106]:** MD8 – 4.Co.11 and 4.Cl.9.

		19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transshipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 27 : speed restricted		
Sounding uncertainty	(SOUACC)		RE	0,1
Status	(STATUS)	1 : permanent 3 : recommended 6 : reserved 9 : mandatory 19 : buoyed	EN	0,*
Technique of sounding measurement	(TECSOU)	1 : found by echo-sounder <del>2 : found by side-scan sonar</del> 3 : found by multi-beam 5 : found by lead-line 6 : swept by wire-drag 7 : found by laser 8 : swept by vertical acoustic system 9 : found by electromagnetic sensor <del>11 : satellite imagery</del> 13 : swept by side-scan sonar	EN	0,*
Traffic	(TRAFIC)	1 : inbound 2 : outbound 3 : one-way 4 : two-way	EN	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

Comment [j107]: S-57  
Extension 06/01.

INT 1 Reference: M 27.1-2

#### 15.15.1 Deep Water route parts (see S-4 – B-435; B-435.3 and B-436.3)

A complete Deep Water route (DW) consists of one or more areas within which the flow of traffic either follows one defined direction for one-way traffic, or follows one defined direction and its reciprocal for two-way traffic.

If it is required to encode these areas, this must be done using the **feature Deep Water Route Part**.

**Remarks:**

- The complex attribute **feature name** should only be used if the individual feature is not aggregated in a collection feature or is the most representative feature in a collection feature (see clause X.X).
- The route must be covered by **Depth Area features**.
- A Deep Water route part may overlap a **Traffic Separation Scheme Lane Part feature**.
- To encode a complete Deep Water route, the **Deep Water Route Centreline**, **Deep Water Route Part features**, and the navigational aids **features** (if they are stated in the regulation defining the DW), may be aggregated using the collection feature **C\_AGGR** (see clause X.X). Where it is required to indicate the name of an aggregated DW, this should be done using a **Sea Area/Named Water Area feature** (see clause X.X), or by populating **feature name** for the most representative **feature** in the DW. Where it is required to populate textual information for the DW, this should be done using a **Nautical Publication Information feature** (see clauses X.X), with complex attributes **information** and/or **textual description** (see clause X.X), or if the information is considered essential for safe navigation, using a **Caution Area feature** (see clause X.X).
- Deep Water routes, unlike dredged areas, are likely to be designated in offshore waters outside the immediate supervision of harbour authorities (although some do form the outer approaches to deep water ports). No least depth quoted can be fully guaranteed in most cases. Normally, least depths within the route must be encoded by soundings as elsewhere on the ENC dataset so that the navigator will not assume that the depths are continually monitored. However, in those cases where a hydrographic authority feels confident to guarantee the existence of a minimum depth of water in a DW route, it must be populated using the attribute **depth range minimum value**.
- The orientation of the Deep Water route part is defined by the centreline of the part and is related to the general direction of traffic flow in the Deep Water route.
- Deep water routes may be included with other routeing measures such as traffic separation schemes to comprise a complete traffic routeing system. To encode the relationship between routeing measures, the **C\_AGGR** defining each routeing measure within the system (or the relevant **feature** if the routeing measure consists of a single **feature**) may be aggregated using **C\_AGGR** to form a hierarchical relationship (see clause X.X). The individual elements comprising different routeing measures must not be aggregated into a single **C\_AGGR**.
- IMO-designated Deep Water routes are listed in IMO publication "Ships' Routeing" Part C.

**Distinction:** Deep Water route centreline; two-way route part.

## 15.16 Traffic separation line

**IHO Definition: TRAFFIC SEPARATION LINE.** A traffic separation scheme is a scheme which aims to reduce the risk of collision in congested and/or converging areas by separating traffic moving in opposite, or nearly opposite, directions. (IHO Dictionary – S-32).

A traffic separation line is a line separating the lanes in which ships are proceeding in opposite, or nearly opposite directions; or separating traffic lanes designated for particular classes of ships proceeding in the same direction. (IMO Ships Routing, 6<sup>th</sup> Edition).

### **S-101 Geo Feature: Traffic separation line (TSSLNE)**

**Primitives:** Curve

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of traffic separation scheme	(CATTSS)	1 : IMO – adopted 2 : not IMO – adopted	EN	0,1
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,0
Status	(STATUS)	1 : permanent 3 : recommended 9 : mandatory 19 : buoyed	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

**Comment [j108]:** S-57  
Extension 06/01.

**INT 1 Reference:** M 12

#### **15.16.1 Traffic separation line (see S-4 – B-435.1 and B-436.3)**

The **feature Traffic Separation Line** must only be used to encode the common boundary of two traffic lanes, or of one traffic lane and one inshore traffic zone.

**Remarks:**

- No remarks.

Distinction: Traffic separation scheme boundary; traffic separation scheme crossing; traffic separation scheme lane part; traffic separation scheme roundabout; traffic separation zone.

## 15.17 Inshore traffic zone

<b>IHO Definition:</b> <b>INSHORE TRAFFIC ZONE.</b> A routing measure comprising a designated area between the landward boundary of a traffic separation scheme and the adjacent coast, to be used in accordance with the provisions of the International Regulations for Preventing Collisions at Sea. (IHO Dictionary – S-32).				
<b>S-101 Geo Feature:</b> Inshore traffic zone (ISTZNE)				
<b>Primitives:</b> Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
<b>S-101 Attribute</b>	<b>S-57 Acronym</b>	<b>Allowable Encoding Value</b>	<b>Type</b>	<b>Multiplicity</b>
Category of traffic separation scheme	(CATTSS)	1 : IMO – adopted 2 : not IMO – adopted	EN	0,1
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,0
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transshipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 27 : speed restricted	EN	0,*
Status	(STATUS)	1 : permanent 3 : recommended 6 : reserved 9 : mandatory 16 : watched 17 : un-watched	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1

Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><b>INT 1 Reference:</b> M 25.1, 25.2</p> <p><b>15.17.1 Inshore traffic zones (see S-4 – B-435.1)</b></p> <p>The <b>feature Inshore Traffic Zone</b> must only be used to encode the designated area between the landward boundary of a traffic separation scheme and the adjacent coast.</p> <p><b>Remarks:</b></p> <ul style="list-style-type: none"> <li>Inshore traffic zones are used to exclude most classes of through traffic. Traffic in an inshore traffic zone is separated from traffic in the adjacent traffic lane by either a separation zone or a separation line (see clauses X.X and X.X). An inshore traffic zone may be adjacent to a precautionary area (see clause X.X).</li> </ul> <p><b>Distinction:</b> Traffic separation scheme crossing; traffic separation scheme lane part; traffic separation scheme roundabout; traffic separation zone; precautionary area.</p>				



## 15.18 Traffic separation scheme crossing

**IHO Definition:** **TRAFFIC SEPARATION SCHEME CROSSING.** A traffic separation scheme is a scheme which aims to reduce the risk of collision in congested and/or converging areas by separating traffic moving in opposite, or nearly opposite, directions. (*IHO Dictionary – S-32*).

A traffic separation scheme crossing is a defined area where traffic lanes cross. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.186, November 2000).

### **S-101 Geo Feature:** Traffic separation scheme crossing (TSSCRS)

**Primitives:** Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of traffic separation scheme	(CATTSS)	1 : IMO – adopted 2 : not IMO – adopted	EN	0,1
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,0
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transshipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 27 : speed restricted	EN	0,*
Status	(STATUS)	1 : permanent 3 : recommended 6 : reserved 9 : mandatory	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1

Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: M 23

#### 15.18.1 Traffic separation scheme crossing (see S-4 – B-435.1)

The **feature Traffic Separation Scheme Crossing** must only be used to encode the area where at least four traffic lanes cross.

Remarks:

- Junctions other than crossings and roundabouts should be encoded using the **feature Traffic Separation Scheme Lane Part** (see clause X.X).
- A **Traffic Separation Scheme Crossing feature** must not overlap a **Traffic Separation Zone feature** at its centre.
- In some cases, a precautionary area is established where routes meet or cross (see clause X.X).

Distinction: Traffic separation line; traffic separation scheme boundary; traffic separation scheme lane part; traffic separation scheme roundabout; traffic separation zone.

### 15.19 Traffic separation scheme roundabout

**IHO Definition:** **TRAFFIC SEPARATION SCHEME ROUNDABOUT.** A traffic separation scheme is a scheme which aims to reduce the risk of collision in congested and/or converging areas by separating traffic moving in opposite, or nearly opposite, directions. (IHO Dictionary – S-32).

A roundabout is a traffic separation scheme in which traffic moves in a counter-clockwise direction around a specified point or zone. (IHO Dictionary – S-32).

#### **S-101 Geo Feature:** Traffic separation scheme roundabout (TSSRON)

**Primitives:** Surface

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of traffic separation scheme	(CATTSS)	1 : IMO – adopted 2 : not IMO – adopted	EN	0,1
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,0
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transshipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 27 : speed restricted	EN	0,*
Status	(STATUS)	1 : permanent 3 : recommended 6 : reserved 9 : mandatory	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1

Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><b>INT 1 Reference:</b> M 21</p> <p><b>15.19.1 Traffic separation scheme roundabout (see S-4 – B-435.1)</b></p> <p>The <b>feature Traffic Separation Scheme Roundabout</b> must only be used to encode the area in which traffic moves in a counter clockwise direction around a specified point or zone.</p> <p><b>Remarks:</b></p> <ul style="list-style-type: none"> <li>• Junctions other than crossings and roundabouts should be encoded using the <b>feature Traffic Separation Scheme Lane Part</b> (see clause X.X).</li> <li>• A <b>Traffic Separation Scheme Roundabout feature</b> must not overlap a <b>Traffic Separation Zone feature</b> at its centre.</li> <li>• In some cases, a precautionary area is established where routes meet or cross (see clause X.X).</li> </ul> <p><b>Distinction:</b> Traffic separation line; traffic separation scheme boundary; traffic separation scheme crossing; traffic separation scheme lane part; traffic separation zone.</p>				

## 15.20 Archipelagic Sea Lane

IHO Definition: <b>ARCHIPELAGIC SEA LANE.</b> Sea lanes designated by an archipelagic State for the passage of ships and aircraft. (IHO Dictionary – S-32).				
<b>S-101 Geo Feature:</b> Archipelagic sea lane (ARCSLN)				
<b>Primitives:</b> Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
<b>S-101 Attribute</b>	<b>S-57 Acronym</b>	<b>Allowable Encoding Value</b>	<b>Type</b>	<b>Multiplicity</b>
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,0
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Nationality	(NATION)		TE	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
INT 1 Reference: M 17				
<b>15.20.1 Archipelagic Sea Lane (see S-4 – B-435.10)</b>				
Article 53 of the United Nations Convention on the Law of the Sea (UNCLOS) states that: "an archipelagic State may designate sea lanes ..., suitable for the continuous and expeditious passage of foreign ships ... through ... its archipelagic waters and the adjacent Territorial Sea. ... All ships ... enjoy the				

right of archipelagic sea lanes passage in such sea lanes ... [which] include all normal passage routes used as routes for international navigation ... through archipelagic waters". (Note: references to aircraft and air routes in UNCLOS have been omitted in these extracts from Article 53). (IHO S-4 B-435.10, C-51 Appendix 2 Part II).

Any archipelagic State which wishes to designate Archipelagic Sea Lanes (ASL) must propose them to IMO for adoption as ASL including all normal passage routes and navigational channels as required by UNCLOS. ASL are adopted by IMO in accordance with the relevant provisions of UNCLOS.

If it is required to encode an Archipelagic Sea Lane, it must be done using **Archipelagic Sea Lane** and/or **Archipelagic Sea Lane Axis** (see clause X.X) **features**, and possibly navigational aids **features**.

The unique character of Archipelagic Sea Lanes (ASLs) is specified by UNCLOS Article 53 and Part H, General Provision of IMO Ships Routing. Further information is provided in the IHO publication C-51 (Manual on Technical Aspects of the United Nations Convention on the Law of the Sea).

The encoding of relationships between these **features** is defined in clause X.X.

**Remarks:**

- The **feature Archipelagic Sea Lane** encodes the **area** of an Archipelagic Sea Lane.
- In some cases only accurate information on the axes (**Archipelagic Sea Lane Axis**, see clause X.X) may be available and in such cases the extents of the ASL (**Archipelagic Sea Lane**) may not be able to be encoded.
- To encode an Archipelagic Sea Lane (ASL) system, the **Archipelagic Sea Lane**, **Archipelagic Sea Lane Axis** **features**, and any navigational aids **features** (if they are stated in the regulation defining the ASL), should be aggregated using the **feature C\_AGGR** (see clause X.X). Where it is required to indicate the name of the ASL system, this should be done using a **Sea Area/Named Water Area feature** (see clause X.X), or by populating the **complex attribute feature name** for the most representative **feature** in the ASL system. Where it is required to populate textual information for the ASL system, this should be done using a **Nautical Publication Information feature** (see clauses X.X), with **complex** attributes **information** and/or **textual description** (see clause X.X), or if the information is considered essential for safe navigation, using a **Caution Area feature** (see clause X.X).
- Traffic within an ASL is not separated, except in any traffic separation schemes which may be designated in an ASL for the safe passage of ships.

**Distinction:** Administrative area; Archipelagic Sea Lane axis; caution area; fairway; inshore traffic zone; recommended traffic lane part; restricted area; submarine transit lane; traffic separation scheme lane part; traffic separation zone; two-way route part.

## 15.21 Archipelagic Sea Lane Axis

**IHO Definition:** **ARCHIPELAGIC SEA LANE AXIS.** The reference line used to determine the maximum extents of an Archipelagic Sea Lane. It may not indicate the deepest water nor any recommended route or track.

**S-101 Geo Feature:** Archipelagic sea lane axis (ASLXIS)

**Primitives:** Curve

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,0
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Nationality	(NATION)		TE	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

**INT 1 Reference:** M 17

### 15.21.1 Archipelagic Sea Lane Axis (see S-4 – B-435.10)

Article 53 of the United Nations Convention on the Law of the Sea (UNCLOS) states that:  
"an archipelagic State may designate sea lanes ..., suitable for the continuous and expeditious passage of

foreign ships ... through ... its archipelagic waters and the adjacent Territorial Sea. ... All ships ... enjoy the right of archipelagic sea lanes passage in such sea lanes ... [which] include all normal passage routes used as routes for international navigation ... through archipelagic waters". (Note: references to aircraft and air routes in UNCLOS have been omitted in these extracts from Article 53). (IHO S-4 B-435.10, C-51 Appendix 2 Part II).

The axis line of an Archipelagic Sea lane (ASL) is encoded in ENCs only for the purpose of defining the sea lane. The axis line does not indicate any routes or recommended tracks as defined in IMO publication "Ships' Routing" Part A.

Remarks:

- To encode an Archipelagic Sea Lane (ASL) system, the **Archipelagic Sea Lane**, **Archipelagic Sea Lane Axis** features, and any navigational aids features (if they are stated in the regulation defining the ASL), should be aggregated using the feature **C\_AGGR** (see clause X.X). Where it is required to indicate the name of the ASL system, this should be done using a **Sea Area/Named Water Area** feature (see clause X.X), or by populating the complex attribute **feature name** for the most representative feature in the ASL system. Where it is required to populate textual information for the ASL system, this should be done using a **Nautical Publication Information** feature (see clauses X.X), with complex attributes **information** and/or **textual description** (see clause X.X), or if the information is considered essential for safe navigation, using a **Caution Area** feature (see clause X.X).

Distinction: Administrative area; Archipelagic Sea Lane; caution area; Deep Water route centreline; fairway; inshore traffic zone; navigation line; recommended route centreline; recommended track; recommended traffic lane part; restricted area; submarine transit lane; traffic separation scheme lane part; traffic separation line; traffic separation zone; two-way route part.



## 15.22 Radio calling-in point

IHO Definition: **RADIO CALLING-IN POINT.** Point at which vessels are required to report to a Traffic Control Center. (IHO Dictionary – S-32).

**S-101 Geo Feature:** Radio calling-in point (RDOCAL)

**Primitives:** Point, Curve

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Call sign	(CALSGN)		TE	0,1
Communication channel	(COMCHA)		TE	0,1
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Orientation	(ORIENT)		RE	1,2
Status	(STATUS)	1 : permanent 3 : recommended 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 9 : mandatory	EN	0,*
Traffic	(TRAFIC)	1 : inbound 2 : outbound 3 : one-way 4 : two-way	EN	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*

Comment [A109]: S-57 Extension 06/01.

Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

**INT 1 Reference:** M 40.1-2

**15.22.1 Radio reporting (calling-in) points (see S-4 – B-488.1 and B-488.2)**

Radio reporting points, also called radio calling-in points, have been established in certain busy waterways and port approaches to assist traffic control. On passing these points or crossing a defined line vessels are required to report on VHF to a Traffic Control Centre.

If it is required to encode a radio reporting point or line, it must be done using the **feature Radio Calling-in Point**.

**Remarks:**

- Each **Radio Calling-in Point feature** must carry **at least** one orientation. If it is required to encode the reciprocal orientation, to indicate that a bearing and its opposite apply to a **Radio Calling-in Point feature**, it must be done using attribute **traffic = 4** (two-way). If the same position is used for another orientation (not opposite) of traffic flow, a second **orientation** attribute must be encoded.
- The complex attribute **feature name**, sub-attribute **name** is used to encode the name and/or alphanumeric designator of the **Radio Calling-in Point**.
- The complex attributes **information** or **textual description** are used to provide additional information, where required. For example, if the requirement to report by radio relates to certain classes of vessels only.
- Radio Calling-in Point features** of type **curve** must be digitised **in a direction** such that the traffic direction that is required to report is to the right.
- If it is required to encode the area of a Vessel Traffic Service (VTS) containing radio reporting points or requiring periodic position reporting, this should be done using the **feature Vessel Traffic Service Area** (see clause X.X). The **Vessel Traffic Service Area** and any associated **Radio Calling-in Point points** may be aggregated using the collection **feature C\_AGGR** (see clause X.X).
- Each VHF-channel should be indicated, using the attribute **communication channel**, in square brackets by 2 digits and up to 2 characters (A-Z); e.g. VHF channel 7 = [07], VHF channel 16 = [16]. The indication of several VHF-channels is possible, with each value being separated by a semicolon; e.g. VHF channels 7 and 16 = [07];[16].

**Distinction:** Radio station; pilot boarding place.

## 15.23 Ferry route

IHO Definition: <b>FERRY ROUTE</b> . A route in a body of water where a ferry crosses from one shoreline to another. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).				
<b>S-101 Geo Feature: Ferry route (FERYRT)</b>				
<b>Primitives:</b> Curve, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
<b>S-101 Attribute</b>	<b>S-57 Acronym</b>	<b>Allowable Encoding Value</b>	<b>Type</b>	<b>Multiplicity</b>
Category of ferry	(CATFRY)	1 : "free-moving" ferry 2 : cable ferry 3 : ice ferry 5 : high speed ferry	EN	1,*
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 9 : mandatory 14 : public	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1

ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p>INT 1 Reference: M 50, 51</p> <p><b>15.23.1 Ferries (see S-4 – B-438)</b></p> <p>Ferry routes should be encoded on the largest maximum display scale ENC datasets:</p> <ul style="list-style-type: none"> <li>• where they cross fairly narrow channels, in order that through traffic is warned of their existence;</li> <li>• where the ferry tracks are short enough to be reasonably accurately represented; and</li> <li>• on ENCs used for harbour navigation, as part of the general information about the area.</li> </ul> <p>If it is required to encode a ferry route, it must be done using the feature <b>Ferry Route</b>.</p> <p><u>Remarks:</u></p> <ul style="list-style-type: none"> <li>• Long distance ferries which have routes varying with weather, tide and traffic should not generally be encoded, although the terminals should be shown on appropriate maximum display scale ENC datasets, using the feature <b>Harbour Facility</b> (see clause X.X), with attribute <b>category of harbour facility</b> = 1 (RoRo-terminal) or 3 (ferry terminal).</li> </ul> <p><u>Distinction:</u></p>				

## 15.24 Radar line

IHO Definition: <b>RADAR LINE</b> . A track along which ships may be guided by coastal radar stations in the event of bad visibility. Also known as a radar guided track. (IHO Dictionary – S-32).				
<b>S-101 Geo Feature: Radar line (RADLNE)</b>				
<b>Primitives:</b> <i>Curve</i>				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
<b>S-101 Attribute</b>	<b>S-57 Acronym</b>	<b>Allowable Encoding Value</b>	<b>Type</b>	<b>Multiplicity</b>
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Orientation	(ORIENT)		RE	1,1
Status	(STATUS)	1 : permanent 2 : occasional 3 : recommended 4 : not in use 7 : temporary	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
INT 1 Reference: M 32.1-2				
<b>15.24.1 Radar reference lines (see S-4 – B-487.2)</b>				
Radar reference lines are mid-channel lines corresponding to lines incorporated in Vessel Traffic Services (VTS) radar displays. A line is used as a positional reference so that the VTS authorities may easily provide a vessel with its position, relative to the line, when visibility is poor. These must be charted on appropriate maximum display scale ENC data.				

If it is required to encode a radar reference line, it must be done using the **feature Radar Line**.

Remarks:

- The value of orientation encoded on the attribute **orientation** should be the value of the bearing from seaward. If it is not possible to define a seaward direction, the value that is less than 180° should be used.

Distinction: Radar range; recommended track.

## 15.25 Radar range

**IHO Definition: RADAR RANGE.** Indicates the coverage of a sea area by a radar surveillance station. Inside this area a vessel may request shore-based radar assistance, particularly in poor visibility. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

**S-101 Geo Feature: Radar range (RADRNG)**

**Primitives:** Surface

Real World		Paper Chart Symbol	ECDIS Symbol	
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Communication channel	(COMCHA)		TE	0,1
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,0
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 7 : temporary	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

**INT 1 Reference:** M 31

**15.25.1 Radar ranges (see S-4 – B-487.1)**

Many large ports have a radar surveillance system covering their approaches to provide guidance for vessels, particularly in poor visibility. The maximum range of the system forms an arc or series of overlapping arcs.

If it is required to encode a radar range, it must be done using the **feature Radar Range**.

Remarks:

- Each VHF-channel should be indicated, using the attribute **communication channel**, in square brackets by 2 digits and up to 2 characters (A-Z); e.g. VHF channel 7 = *[07]*, VHF channel 16 = *[16]*. The indication of several VHF-channels is possible, with each value being separated by a semicolon; e.g. VHF channels 7 and 16 = *[07];[16]*.

Distinction: Radar line.



## 15.26 Radar station

**IHO Definition:** **RADAR STATION.** A station with a transmitter emitting pulses of ultra-high frequency radio waves which are reflected by solid objects and are detected upon their return to the sending station. (International Maritime Dictionary, 2<sup>nd</sup> Edition).

**S-101 Geo Feature: Radar station (RADSTA)****Primitives: Point***Real World**Paper Chart Symbol**ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Call sign	(CALSGN)		TE	0,1
Category of radar station	(CATRAS)	1 : radar surveillance station 2 : coast radar station	EN	0,1
Communication channel	(COMCHA)		TE	0,1
Date range			C	0,1
Date end	(PEREND)	ISO 8601:1988	(S) DA	0,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	1,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 7 : temporary 8 : private	EN	0,*
Value of maximum range	(VALMXR)		RE	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1

**Comment [A110]:** S-57 Extension 06/01.

**Comment [A111]:** MD8 – 5.Co.3

Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: M 30; S 1

**15.26.1 Radar station (see S-4 – B-485.1 and B-487.3)**

If it is required to encode a radar station, it must be done using the **feature Radar Station**.

Remarks:

- Coast radar stations are shore-based stations which the mariner can contact by radio to obtain a position. These stations are being increasingly replaced by other position-fixing methods.
- The **Radar Station** must only be used to encode the technical equipment itself, independent of the building or structure in which it is installed. If it is required to encode the building or structure (e.g. mast, tower, radar dome) it must be done using an appropriate **feature** (e.g. **Building, Landmark**).
- The attribute **height** is used to encode the height of the emitting part of the radar, where known.
- Each VHF-channel should be indicated, using the attribute **communication channel**, in square brackets by 2 digits and up to 2 characters (A-Z); e.g. VHF channel 7 = [07], VHF channel 16 = [16]. The indication of several VHF-channels is possible, with each value being separated by a semicolon; e.g. VHF channels 7 and 16 = [07];[16].

Distinction: Radar line; radar range; radar transponder beacon.

## 16 Areas, limits

### 16.1 International boundaries and national limits (see S-4 – B-440)

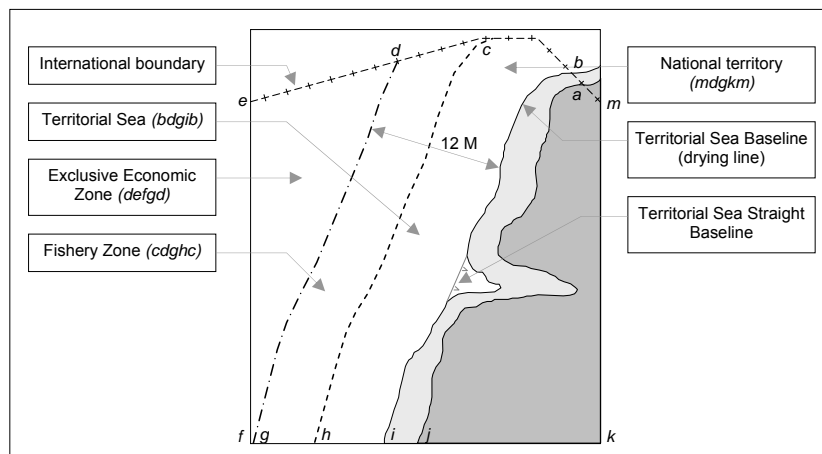
The United Nations Convention on the Law of the Sea, 1982 came into force on 16 November 1994. UNCLOS contains navigational provisions as well as provisions for determining the limits of various maritime zones. These provisions are binding to all states that have ratified the Convention. For technical aspects of UNCLOS, see IHO publication C-51.

IHO Member States should show, on selected series of their ENCs, their own baseline and maritime limits in accordance with UNCLOS (former IHO Technical Resolution B2.35).

The mariner may be interested in the exact location of international maritime boundaries for two principal reasons:

- When crossing a boundary they could be subject to different laws and regulations which may effect their navigation, e.g. buoyage systems, pilotage regulations, fishing rights, reporting procedures, pollution regulations.
- Where a boundary passes through groups of offshore islands they may wish to know upon which side of the boundary a particular island falls.

### 16.2 Maritime jurisdiction areas



The clauses in Section 16 below provide guidance for the encoding of maritime jurisdiction areas. Occasionally, these “areas” may actually be defined as linear due to international treaties, or the areas may not be fully defined and it may therefore be necessary to encode the boundary as a linear feature. Clause X.X defining features permitted for use in ENC and their geometric primitives does not allow many of the feature classes relating to maritime jurisdiction areas to be encoded as type curve.

If it is required to encode a linear maritime jurisdiction feature, it must be done using the corresponding feature class as outlined in Section 16 below. If the “curve” primitive is not permitted for the related feature class, the linear maritime jurisdiction feature must be encoded as a “very narrow surface”, and by masking all the edges of the area that are not relevant (i.e. are not along the reference line). **Note that this method must not be used where an area can be defined.**

The “very narrow surface” should be a surface having an edge corresponding to the reference line and be about 0.2mm in width at the maximum display scale of the ENC data. Caution notes for such areas must be encoded using the complex attributes information and/or textual description.

### 16.3 Anchorage area

**IHO Definition:** **ANCHORAGE AREA.** An area in which vessels **or seaplanes** anchor or may anchor. (Adapted from IHO Dictionary – S-32).

**Comment [j112]:** MD8 – 7.Cl.3 and 7.Co.15.

**S-101 Geo Feature:** Anchorage area (ACHARE)

**Primitives:** Point, Surface

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of anchorage	(CATACH)	1 : unrestricted anchorage 2 : deep water anchorage 3 : tanker anchorage 4 : explosives anchorage 5 : quarantine anchorage 6 : seaplane anchorage 7 : small craft anchorage 8 : small craft mooring area 9 : anchorage for periods up to 24 Hours 10 : anchorage for a limited period of time	EN	0,*
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Restriction	(RESTRN)	2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 15 : construction prohibited 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited	EN	0,*

		21 : drilling restricted 23 : cargo transshipment (lightening) prohibited 24 : dragging prohibited 27 : speed restricted 28 : swimming prohibited		
Status	(STATUS)	1 : permanent 2 : occasional 3 : recommended 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 9 : mandatory 14 : public	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

**Comment [j113]:** S-57  
Extension 06/01.

**INT 1 Reference:** N 10, 12.1-9, 14; Q 44

#### 16.3.1 Anchorages (see S-4 – B-431.1; B-431.3 and B-431.7)

Where the limits of anchorages are defined by a regulatory authority (e.g. harbour authority) they must be shown on the largest maximum display scale ENC data. They may also be shown on other maximum display scale ENC datasets where useful, e.g. for planning purposes.

If it is required to encode an anchorage area, including anchorages for seaplanes, it must be done using the **feature Anchorage Area**.

##### Remarks:

- The complex attribute **feature name**, sub-attribute **name** is used to encode the name and/or number of the **Anchorage Area**.
- The complex attributes **information** or **textual description** are used to provide additional information about the category of anchorage, where required.
- Individual recommended anchorages without defined limits should be encoded as **Anchorage Area features** of type point, with attributes **category of anchorage** = 1 (unrestricted anchorage) and **status** = 3 (recommended).
- Areas with numerous small craft moorings may be encoded as **Anchorage Area features** of type **surface**, with **category of anchorage** = 8 (small craft mooring area). For the encoding of mooring buoys, see clause X.X.
- If it is required to encode an anchorage which may be used for a period of not more than 24 hours, it must be done using **category of anchorage** = 9 (anchorage for periods up to 24 hours).
- If it is required to encode an anchorage with a specific, limited time period, it must be done using **category of anchorage** = 10 (anchorage for limited period of time). The specific limit of time should be encoded using the complex attribute **information** (e.g. *Anchorage limited to 12 hours*).

- Areas where anchoring is prohibited must be encoded, where required, as **Restricted Area** (see clause **X.X**) with attribute **restriction = 1** (anchoring prohibited).

Distinction: Anchor berth; mooring/warping facility.

## 16.4 Anchor berth

<b>IHO Definition:</b> <b>ANCHOR BERTH.</b> A designated area of water where a single vessel, seaplane, etc... may anchor. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).				
<b>S-101 Geo Feature:</b> Anchor berth (ACHBRT)				
<b>Primitives:</b> Point, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of anchorage	(CATCH)	1 : unrestricted anchorage 2 : deep water anchorage 3 : tanker anchorage 4 : explosives anchorage 5 : quarantine anchorage 6 : seaplane anchorage 7 : small craft anchorage 8 : small craft mooring area 9 : anchorage for periods up to 24 Hours 10 : anchorage for a limited period of time	EN	0,*
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Radius	(RADIUS)		RE	0,1
Status	(STATUS)	1 : permanent 2 : occasional 3 : recommended 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 9 : mandatory 14 : public	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1

Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: N 11.1, 11.2

#### 16.4.1 Anchor berths (see S-4 – B-431.2)

Where the positions or limits of anchorages, including anchor berths, are defined by a regulatory authority (e.g. harbour authority) they must be shown on the largest maximum display scale **ENC data**. They may also be shown on other maximum display scale **data** where useful, e.g. for planning purposes.

If it is required to encode an anchor berth, it must be done using the **feature Anchor Berth**.

#### Remarks:

- The complex attribute **feature name**, sub-attribute **name** is used to encode the name and/or number of the **Anchor Berth**.
- The complex attributes **information** or **textual description** are used to provide additional information about the category of anchorage, where required.
- If an anchor berth is defined by a centre point and a swinging circle, it should be of type point, with the radius of the swinging circle encoded using the attribute **radius**.

Distinction: Anchorage area; berth; mooring/warping facility.



## 16.5 Seaplane landing area

IHO Definition: **SEAPLANE LANDING AREA.** A designated portion of water for the landing and take-off of seaplanes. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.152, November 2000).

### **S-101 Geo Feature:** Seaplane landing area (SPLARE)

**Primitives:** Point, Surface

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Date range			C	0,1
Date end	(PEREND)	ISO 8601:1988	(S) DA	0,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	1,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 7 : entry prohibited 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 14 : area to be avoided 15 : construction prohibited 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transshipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 27 : speed restricted 28 : swimming prohibited	EN	0,*

**Comment [j114]:** S-57 Extension 06/01.

Status	(STATUS)	1 : permanent 2 : occasional 3 : recommended 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 9 : mandatory 14 : public	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><u>INT 1 Reference:</u> N 13</p> <p><b>16.5.1 Seaplane landing areas (see S-4 – B-449.6)</b></p> <p>If it is required to encode a seaplane landing area, it must be done using the <b>feature Seaplane Landing Area</b>.</p> <p><u>Remarks:</u></p> <ul style="list-style-type: none"> <li>If it is required to encode an anchorage for seaplanes, it must be done using an <b>Anchorage Area feature</b> (see clause X.X), with attribute <b>category of anchorage</b> = 6 (seaplane anchorage).</li> </ul> <p><u>Distinction:</u> Airport area <b>runway</b>.</p>				

## 16.6 Dumping ground

**IHO Definition:** **DUMPING GROUND.** A sea area where dredged material or other potentially more harmful material, e.g. explosives, chemical waste, is deliberately deposited. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.59, November 2000).

**S-101 Geo Feature:** Dumping ground (DMPGRD)

**Primitives:** Point, Surface

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of dumping ground	(CATDPG)	2 : chemical waste dumping ground 3 : nuclear waste dumping ground 4 : explosives dumping ground 5 : spoil ground 6 : vessel dumping ground	EN	0,*
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 7 : entry prohibited 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 14 : area to be avoided 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transshipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited	EN	0,*

		27 : speed restricted		
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 6 : reserved 7 : temporary	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

**INT 1 Reference:** N 23, 24, 62.1, 62.2

#### 16.6.1 Dumping grounds (see S-4 – B-442; B-446 and B-446.1)

Materials deliberately dumped at sea in specified areas (other than those associated with reclamation works) may be classified, according to their significance to the mariner, as follows:

- Materials which are generally dispersed before reaching the seabed, e.g. sewage sludge, are of little navigational significance and no charting action is usually required.
- Spoil from dredging operations or other works which might reduce charted depths significantly in the designated spoil ground.
- Harmful materials, including explosives and chemicals, which are likely to remain concentrated on the seabed.

Dumping of harmful materials is unlikely to affect depths substantially and such dumping grounds are encoded primarily as a warning against anchoring, trawling or other submarine operations.

If it is required to encode a dumping ground, it must be done using the **feature Dumping Ground**.

#### Remarks:

- A **Dumping Ground** feature of type **surface** must be covered by features from Group 1 as appropriate (**Depth Area** or **Unsurveyed Area**).
- Disused dumping grounds for harmful materials are considered dangerous for an indefinite period and must therefore be encoded on the **largest** maximum display scale **ENC** datasets, with attribute **status** = 4 (not in use). The date when the area ceased to be used may be populated using the **complex** attribute **information**, if known.
- Within a spoil ground; if the depths within the area are liable to be very much less than charted after the discharge of spoil, they may be treated as unsurveyed areas (see clause **X.X**), in which case soundings and depth contours may be omitted from the area.

#### 16.6.2 Spoil grounds, dredging areas (see S-4 – B-446)

Spoil grounds are areas set aside, clear of shipping channels and in deep water where possible, for the disposal of material (spoil) generally obtained by dredging. Their significance to the mariner is that very large quantities of material may be dumped, decreasing the depth of water available.

Extraction (or dredging) areas are those areas where a concentration of dredging vessels may be encountered, taking up sand or shingle to be brought ashore (e.g. for construction purposes). Their

significance is primarily as a collision hazard, although they also indicate the likelihood of finding a greater depth of water than charted. Channels dredged to provide an adequate depth of water for navigation are "dredged areas", not to be confused with "dredging areas".

If it is required to encode a spoil ground, it must be done using a **Dumping Ground feature**, with attribute **category of dumping ground** = 5 (spoil ground).

If it is required to encode a dredging area, it must be done using a **Restricted Area feature** (see clause X.X), with attribute **category of restricted area** = 21 (dredging area).

Distinction: Dredged area; incineration area.

## 16.7 Military practice area

<b>IHO Definition:</b> <b>MILITARY PRACTICE AREA.</b> An area within which naval, military or aerial exercises are carried out. Also called an exercise area. (Adapted from <b>IHO Dictionary – S-32</b> ).				
<b>S-101 Geo Feature:</b> Military practice area (MIPARE)				
<b>Primitives:</b> Point, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
<b>S-101 Attribute</b>	<b>S-57 Acronym</b>	<b>Allowable Encoding Value</b>	<b>Type</b>	<b>Multiplicity</b>
Category of military practice area	(CATMPA)	2 : torpedo exercise area 3 : submarine exercise area 4 : firing danger area 5 : mine-laying practice area 6 : small arms firing range	EN	0,*
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 7 : entry prohibited 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 14 : area to be avoided 15 : construction prohibited 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transhipment	EN	0,*

		(lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 26 : landing prohibited 27 : speed restricted 28 : swimming prohibited		
Status	(STATUS)	1 : permanent 2 : occasional 5 : periodic/intermittent 6 : reserved 7 : temporary 16 : watched 17 : un-watched	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

**Comment [j115]:** S-57  
Extension 06/01.

**INT 1 Reference:** N 30-33

#### 16.7.1 Military practice areas (see S-4 – B-441.1-6)

Military practice (or exercise) areas at sea are of various types and may be classified as follows with regard to their significance for the mariner:

- Firing danger areas, sometimes called firing practice areas, i.e. permanent or temporary ranges, including bombing, torpedo and missile ranges.
- Mine-laying practice (and counter-measures) areas.
- Submarine exercise areas.
- Other exercise areas.

Some degree of restriction on navigation and other rights may be implied by the encoding of military practice areas. There may be varying interpretations of the validity of the restrictions and possible infringement of the rights of innocent passage through territorial waters and elsewhere. Where it is thought desirable to depict such areas, even though clear range procedure may be observed, or the areas appear to be a derogation of the freedom of the seas, mariners should be informed (not necessarily on ENCs) that publication of the details of a law or regulation is solely for the safety and convenience of shipping and implies no recognition of the international validity of the law or regulation. By this means infringements are not condoned but the mariner receives a warning which may be necessary for their safety.

If it is required to encode a military practice area, it must be done using the feature **Military Practice Area**.

#### Remarks:

- Submarine exercise areas should not be encoded because submarines exercise over wide areas which it would not be practicable to depict, and over which cautions (to keep a good look out for them) are unlikely to be effective. They may, however, be encoded where they occur in or near major shipping lanes or port approaches.
- Firing danger areas at sea are frequently marked by IALA special buoys sometimes laid around the

perimeter of the area and/or by specially erected lights, beacons and targets. If required, all such features which could assist the navigator in identifying their position, or could be a hazard, must be encoded in the normal way,

- The existence of mine laying (and counter-measures/clearance) practice areas implies the possibility of unexploded mines or depth charges on the sea floor, and also the presence of harmless practice mines.

Distinction: Caution area; restricted area; submarine transit lane.



## 16.8 Administration area (named)

IHO Definition: <b>ADMINISTRATION AREA.</b> A defined (and possibly named) administrative area. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.3, November 2000).				
<b>S-101 Geo Feature:</b> Administration area (named) (ADMARE)				
<b>Primitives:</b> Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Jurisdiction	(JRSDTN)	1 : international 2 : national 3 : national sub-division	EN	1,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Nationality	(NATION)		TE	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
INT 1 Reference: N 40, 41				
<b>16.8.1 International and national territories (see S-4 – B-440.1 and B-440.3)</b>				
International maritime boundaries are those which have been established by agreement between adjacent or opposite States. Boundaries are sometimes negotiated on the basis of the equidistance or "median" line principle. For various reasons, however, agreed boundaries even when negotiated on this principle are seldom true median lines.				
Navigationally, international boundaries may vary in their significance over different parts of their lengths.				

Inshore, they may represent the delimitation of Territorial Seas of two states or "internal waters", (e.g. within bay closing lines or straight baseline systems). Offshore, they may represent Exclusive Economic Zone and/or Continental Shelf boundaries.

If it is required to encode a **named international or national territory**, it must be done using the **feature Administration Area (Named)**.

Remarks:

- International land boundaries should be encoded, at least in the vicinity of coasts.

Distinction: Contiguous Zone; Continental Shelf area; Exclusive Economic Zone; fishery zone; land region; Territorial Sea area.

## 16.9 Cargo transshipment area

<b>IHO Definition:</b> <b>CARGO TRANSHIPMENT AREA.</b> An area designated for the transfer of cargo from one vessel to another to reduce the draught of the larger vessel. Also called lightening or cargo transfer area. (IHO Dictionary – S-32).				
<b>S-101 Geo Feature: Cargo transshipment area (CTSARE)</b>				
<b>Primitives:</b> Point, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Status	(STATUS)	1 : permanent 2 : occasional 3 : recommended 5 : periodic/intermittent 6 : reserved 7 : temporary 9 : mandatory	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: N 64

**16.9.1 Cargo transshipment areas (see S-4 – B-449.4)**

Areas generally outside port limits may be specifically designated as suitable for the transshipment of oil or other materials from large ships to smaller vessels. The areas selected are relatively sheltered locations and lie off main shipping routes. As the purpose of transshipment is usually to reduce the draught of the larger vessel to allow it to proceed to port, the operation is often known as "lightening" and the areas may be known as "lightening areas" or "cargo transfer areas".

If it is required to encode a cargo transshipment area, it must be done using the **feature Cargo Transshipment Area**.

Remarks:

- The encoding of cargo transshipment areas should be adequate to warn other vessels of the likelihood of encountering ships restricted in their ability to manoeuvre. Regulations governing the use of such areas may be included using the **complex attributes information or textual description**.

Distinction: Dock area; harbour area (administrative); harbour facility.

## 16.10 Caution area

<b>IHO Definition:</b> <b>CAUTION AREA.</b> Generally, an area where the mariner has to be made aware of circumstances influencing the safety of navigation. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.33, November 2000).				
<b>S-101 Geo Feature:</b> Caution area (CTNARE)				
<b>Primitives:</b> Point, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<b>INT 1 Reference:</b> <b>16.10.1 Caution areas (see S-4 – B-242)</b> If it is required to identify an area in which the mariner must be aware of circumstances influencing the safety of navigation (e.g. an area of continually changing depths), and which cannot be encoded using <b>other</b> feature types, it must be done using the <b>feature Caution Area</b> . This <b>feature</b> may be required to identify a danger, a risk, a rule or advice that is not directly related to a particular object. <b>Remarks:</b> <ul style="list-style-type: none"> <li>At least one of the complex attributes <b>information</b> or <b>textual description</b> must be used to encode the relevant cautionary information.</li> <li>If the information applies to a specific area the <b>Caution Area feature</b> should cover only that area.</li> <li>Information which may be of use to the mariner, but is not significant to safe navigation and cannot be encoded using <b>other</b> feature types, should be encoded using an <b>Nautical Publication Information</b> feature (see clause X.X), and using the complex attributes <b>information</b> and/or <b>textual description</b> (see clause X.X). <b>As Nautical Publication Information of type surface do not display in ECDIS, such surfaces should be encoded to cover the entire area of data coverage for the cell.</b> This encoding is intended to reduce the</li> </ul>				

number of alarms or indications generated in the ECDIS due to the overuse of **Caution Area features**.

- Notes should be kept to a minimum and be as concise as is compatible with accuracy and intelligibility. Hydrographic terminology (jargon) should be avoided, giving preference to easily understood words, e.g. "depths" rather than "bathymetry".

#### 16.10.1.1 Collision regulations

Some nations have introduced collision regulations (COLREG's) that may include demarcation lines differentiating between inland water rules and International Rules as a result of the Convention on the International Regulations for Preventing Collisions at Sea 1972. If it is required to encode COLREG's, it should be done using a narrow **Caution Area feature** of type **surface** covering the demarcation line, with **complex** attributes **information** and/or **textual description** containing a short explanation about the regulation, (e.g. cautionary note from the paper chart). The **complex** attribute **textual description** may be used instead of **information**, or for longer explanations or notes.

Distinction: Wrecks; obstructions; underwater rocks; unsurveyed area.

## 16.11 Contiguous Zone

**IHO Definition:** **CONTIGUOUS ZONE.** A zone contiguous to a coastal State's Territorial Sea, which may not extend beyond 24 nautical miles from the baselines from which the breadth of the Territorial Sea is measured. The coastal state may exercise certain control in this zone subject to the provisions of International Law. (IHO Dictionary – S-32).

### **S-101 Geo Feature:** Contiguous zone (CONZNE)

**Primitives:** Surface

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,0
Nationality	(NATION)		TE	1,1
Status	(STATUS)	1-: permanent	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

**INT 1 Reference:** N 44

#### **16.11.1 Contiguous Zones (see S-4 – B-440.6)**

The Contiguous Zone is a zone adjacent to the Territorial Sea where the coastal state may exercise the control necessary to prevent or punish infringement of its customs, fiscal, immigration or sanitary laws and regulations within its territory or Territorial Sea. Under UNCLOS, the outer limits of this zone may not extend beyond 24 nautical miles measured from the Territorial Sea Baselines.

If it is required to encode the Contiguous Zone, it must be done using the feature **Contiguous Zone**.

#### **Remarks:**

- Where issues of maritime jurisdiction between two or more coastal States are in dispute, the proposed Contiguous Zone of one coastal State may overlap the proposed Contiguous Zone of another coastal State.

Where an area is in dispute, a **Caution Area** object should be encoded covering the entire disputed area, with caution notes advising that the area is in dispute encoded using the complex attributes **information** and/or **textual description**.

Distinction: Administrative area; Continental **Shelf** area; Exclusive Economic Zone; fishery zone; Territorial Sea area.



## 16.12 Continental Shelf area

**IHO Definition: CONTINENTAL SHELF AREA.** The Continental Shelf of a coastal State comprises the seabed and subsoil of the submarine areas that extend beyond its Territorial Sea throughout the natural prolongation of its land territory to the outer edge of the continental margin, or to a distance of 200 nautical miles from the baselines from which the breadth of the Territorial Sea is measured where the outer edge of the continental margin does not extend out to that distance. (IHO Publication C-51).

### **S-101 Geo Feature: Continental shelf area (COSARE)**

**Primitives:** Surface

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Nationality	(NATION)		TE	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: N 46

#### **16.12.1 Continental Shelf (see S-4 – B-440.8)**

The delineation of the Continental Shelf beyond 200 nautical miles from the Territorial Sea baselines is complex. Details are given in UNCLOS (see IHO Publication C-51). The coastal State exercises sovereign rights over the Continental Shelf for the purpose of exploring it and exploiting its natural resources. Complex procedures exist within UNCLOS for the establishment of the limits of the Continental Shelf. Where these procedures have been followed the area should be encoded on suitable maximum display scale ENC data.

If it is required to encode the Continental Shelf, it must be done using the feature **Continental Shelf Area**.

Remarks:

- No remarks.

Distinction: Administrative area; Contiguous Zone; Exclusive Economic Zone; fishery zone; Territorial Sea area.

### 16.13 Custom zone

<b>IHO Definition:</b> CUSTOM AREA. The area within which national custom regulations are in force. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.46, November 2000).				
<b>S-101 Geo Feature:</b> Custom zone (CUSZNE)				
<b>Primitives:</b> Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
<b>S-101 Attribute</b>	<b>S-57 Acronym</b>	<b>Allowable Encoding Value</b>	<b>Type</b>	<b>Multiplicity</b>
Nationality	(NATION)		TE	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<b>INT 1 Reference:</b> N 48 <b>16.13.1 Custom Zones (see S-4 – B-440.2)</b> If it is required to encode a custom zone, it must be done using the <b>feature Custom Zone</b> . Custom zones, where details are provided by a regulatory authority, should be encoded on the largest maximum display scale ENC data covering the area. <b>Remarks:</b> • No remarks. <b>Distinction:</b> Check point; free port area.				

## 16.14 Exclusive Economic Zone

**IHO Definition:** **EXCLUSIVE ECONOMIC ZONE.** An area, not exceeding 200 nautical miles from the baselines from which the breadth of the Territorial Sea is measured, subject to a specific legal regime established in the United Nations Convention on the Law of the Sea under which the coastal state has certain rights and jurisdiction. (IHO Dictionary – S-32).

### **S-101 Geo Feature:** Exclusive economic zone (EXEZNE)

**Primitives:** Surface

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Nationality	(NATION)		TE	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

**INT 1 Reference:** N 47

#### **16.14.1 Exclusive Economic Zones (see S-4 – B-440.9)**

In the Exclusive Economic Zone, the coastal State has sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living, of the waters superjacent to the sea-bed and of the seabed and its subsoil, and with regard to other activities for the economic exploitation and exploration of the Zone, such as the production of energy from the water, currents and winds.

If it is required to encode an Exclusive Economic Zone (EEZ), it must be done using the **feature Exclusive Economic Zone**.

**Remarks:**

- For areas of disputed maritime jurisdiction claims containing overlapping **Exclusive Economic Zone** and **Territorial Sea Area** features, see clause **XX**.

**Distinction:** Administrative area; Contiguous Zone; Continental Shelf area; fishery zone; Territorial Sea area.

**16.15 Fishery zone**

**IHO Definition:** **FISHERY ZONE.** The offshore zone in which exclusive fishing rights and management are held by the coastal nation. (IHO Dictionary – S-32).

**S-101 Geo Feature: Fishery zone (FSHZNE)**

**Primitives:** Surface

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Nationality	(NATION)		TE	1,1
Status	(STATUS)	1 : permanent 5 : periodic/intermittent 6 : reserved 7 : temporary	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

**INT 1 Reference:** N 45

**16.15.1 Fishery zones (see S-4 – B-440.7)**

A fishery zone is an area inside and beyond the Territorial Sea where a coastal State proclaims that it alone may regulate fishing. Where States have permitted others to fish in parts of the area, it may be desirable to encode the area of both the full area and the area of special concessionary rights. In some instances, claims are described as "conservation zones"; for practical purposes these may be classed with fishery zones since their intended function is to institute fishery conservation measures. Most of the fishery zone claims are

limited by fixed distance (200 nautical miles in some cases) from the Territorial Sea baselines.

If it is required to encode a fishery zone, it must be done using the feature **Fishery Zone**.

Remarks:

- Fishery zones commonly coincide with other zones such as Continental Shelf and Exclusive Economic Zone.

Distinction: Administrative area; Contiguous Zone; Continental Shelf area; Exclusive Economic Zone; fishing ground; restricted area; Territorial Sea area.

## 16.16 Fishing ground

IHO Definition: <b>FISHING GROUND</b> . A water area in which fishing is frequently carried on. (IHO Dictionary – S-32).				
<b>S-101 Geo Feature: Fishing ground (FSHGRD)</b>				
<b>Primitives:</b> Surface				
Real World	Paper Chart Symbol	ECDIS Symbol		
<b>S-101 Attribute</b>	<b>S-57 Acronym</b>	<b>Allowable Encoding Value</b>	<b>Type</b>	<b>Multiplicity</b>
Date range			C	0,1
Date end	(PEREND)	ISO 8601:1988	(S) DA	0,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	1,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 7 : entry prohibited 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 14 : area to be avoided 15 : construction prohibited 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transshipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 26 : landing prohibited 27 : speed restricted	EN	0,*

**Comment [A116]:** S-57  
Extension 06/01.

		28 : swimming prohibited		
Status	(STATUS)	1 : permanent 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 14 : public 16 : watched 17 : un-watched 19 : buoyed	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><b>INT 1 Reference:</b></p> <p><b>16.16.1 Fishing grounds</b></p> <p>If it is required to encode a fishing ground, it must be done using the <b>feature Fishing Ground</b>.</p> <p><u>Remarks:</u></p> <ul style="list-style-type: none"> <li>No remarks.</li> </ul> <p><u>Distinction:</u> Fishery zone; marine farm/culture.</p>				

**Comment [j117]:** S-57  
Extension 06/01.

**Comment [j118]:** S-57  
Extension 06/01.



**16.17 Free port area**

IHO Definition: <b>FREE PORT AREA</b> . A port where certain import and export duties are waived (unless goods pass into the country) to facilitate reshipment to other countries. (IHO Dictionary – S-32).				
<b>S-101 Geo Feature: Free port area (FRPARE)</b>				
<b>Primitives:</b> Surface				
Real World	Paper Chart Symbol	ECDIS Symbol		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Status	(STATUS)	1 : permanent 6 : reserved 8 : private 14 : public	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<b>INT 1 Reference:</b> <b>16.17.1 Free port areas</b> If it is required to encode a free port area, it must be done using the <b>feature Free Port Area</b> . <b>Remarks:</b> • No remarks. <b>Distinction:</b> Custom zone; production/storage area.				

**16.18 Harbour area (administrative)**

IHO Definition: <b>HARBOUR AREA.</b> The area over which a harbour authority has jurisdiction. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.80, November 2000).				
<b>S-101 Geo Feature:</b> Harbour area (administrative) (HRBARE)				
<b>Primitives:</b> Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Status	(STATUS)	1 : permanent 4 : not in use 6 : reserved 8 : private 14 : public 16 : watched 17 : un-watched	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
INT 1 Reference: N 49				
<b>16.18.1 Administrative harbour areas (see S-4 – B-430.1)</b>				
Administrative harbour areas must be shown on at least the largest maximum display scale ENC datasets, where possible, to assist mariners in complying with harbour regulations.				
If it is required to encode an administrative harbour area, it must be done using the feature <b>Harbour Area</b> .				

Remarks:

- A masked line may be used to suppress the symbolisation of the boundary, where such symbolisation is considered inappropriate.

Distinction: Dock area.

## 16.19 Incineration area

IHO Definition: <b>INCINERATION AREA</b> . An offshore area officially designated as suitable for the burning of chemical waste by specially equipped ships. (IHO Dictionary – S-32).				
<b>S-101 Geo Feature:</b> Incineration area (ICNARE)				
<b>Primitives:</b> Point, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Date range			C	0,1
Date end	(PEREND)	ISO 8601:1988	(S) DA	0,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	1,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 7 : entry prohibited 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 14 : area to be avoided 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transshipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 27 : speed restricted 28 : swimming prohibited	EN	0,*
Status	(STATUS)	1 : permanent	E	0,*

**Comment [j119]:** S-57  
Extension 06/01.

		2 : occasional 5 : periodic/intermittent 6 : reserved 7 : temporary 16 : watched 17 : un-watched		
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><u>INT 1 Reference:</u> N 65</p> <p><b>16.19.1 Incineration areas (see S-4 – B-449.3)</b></p> <p>If it is required to encode an incineration area, it must be done using the <b>feature Incineration Area</b>.</p> <p><u>Remarks:</u></p> <ul style="list-style-type: none"> <li>No remarks.</li> </ul> <p><u>Distinction:</u> Custom ground.</p>				

## 16.20 Log pond

**IHO Definition:** **LOG POND.** A maritime area enclosed with connected floating timbers used as a staging area for sawn logs. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.102, November 2000).

### **S-101 Geo Feature:** Log pond (LOGPON)

**Primitives:** Point, Surface

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Status	(STATUS)	1 : permanent 2 : occasional 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

**INT 1 Reference:** N 61

#### **16.20.1 Log ponds (see S-4 – B-449.2)**

If it is required to encode a log pond (also known as booming ground), it must be done using the feature **Log Pond**.

**Remarks:**

- It is not required to separately encode any posts, piles or other log pond barrier supports.

<u>Distinction:</u>
---------------------

## 16.21 Oil barrier

IHO Definition: <b>OIL BARRIER</b> . A floating barrier to stop and contain the spread of oil on a water body surface. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).				
<b>S-101 Geo Feature:</b> Oil barrier (OILBAR)				
<b>Primitives:</b> Curve				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of oil barrier	(CATOLB)	1 : oil retention (high pressure pipe) 2 : floating oil barrier	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,0
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1



ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p>INT 1 Reference: F 29</p> <p><b>16.21.1 Oil barriers (see S-4 – B-449.2)</b></p> <p>If it is required to encode an oil barrier, it must be done using the <b>feature Oil Barrier</b>.</p> <p><u>Remarks:</u></p> <ul style="list-style-type: none"><li>• No remarks.</li></ul> <p><u>Distinction:</u></p>				

## 16.22 Straight Territorial Sea Baseline

**IHO Definition:** **STRAIGHT TERRITORIAL SEA BASELINE.** A baseline is the line from which the outer limits of the Territorial Sea and certain other outer limits are measured. (IHO Dictionary – S-32).

Straight baselines are a system of straight lines joining specified or discrete points on the low-water line, usually known as straight baseline turning points. (IHO Dictionary – S-32).

**S-101 Geo Feature:** Straight territorial sea baseline (STSLNE)

**Primitives:** Curve

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Nationality	(NATION)		TE	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

**INT 1 Reference:** N 42

### 16.22.1 Straight Territorial Sea Baselines (see S-4 – B-440.4)

A Territorial Sea is delimited by:

- Territorial Sea Baselines (drying lines);
- Straight Territorial Sea Baselines;
- International maritime boundaries (see clause X.X); and
- Seaward limits of Territorial Seas (see clause X.X).

The term "Baseline" refers to the line from which the breadth of the Territorial Sea, the outer limits of the Contiguous Zone, the Exclusive Economic Zone and, in some cases, the Continental Shelf are measured. It is also the dividing line between internal waters and territorial seas. Internal waters comprise all areas of the sea on the landward side of the Territorial Sea Baselines, as well as inland waters including rivers, lakes, etc.

The normal baseline is the low water line (which is not defined any more precisely by UNCLOS) of the mainland, islands, or low tide elevations, as depicted on large scale charts officially recognised by the coastal State; they therefore do not require depiction in ENCs. Features which are naturally-formed and dry at low water (e.g. rocks, reefs, sand banks) may be considered low-tide elevations and included in the baseline (details are given in UNCLOS - see IHO publication C-51).

A straight baseline may be used:

- as a closing line across the mouth or estuary of a river;
- as a closing line across the mouth of a juridical bay or a historical bay;
- as part of a system of Straight Territorial Sea Baselines, e.g. to connect seaward points on a deeply indented coastline, a coastline that is fringed with islands, around unstable coastlines; or
- as an archipelagic baseline.

If it is required to encode a Straight Territorial Sea Baseline, it must be done using the **feature Straight Territorial Sea Baseline**.

Remarks:

- No remarks.

Distinction:

### 16.23 Territorial Sea area

IHO Definition: **TERRITORIAL SEA AREA.** A belt of water of a defined breadth but not exceeding 12 nautical miles measured seaward from the Territorial Sea Baseline. (IHO Dictionary – S-32).

#### **S-101 Geo Feature: Territorial sea area (TESARE)**

**Primitives:** Surface

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Nationality	(NATION)		TE	1,1
Restriction	(RESTRN)	<del>1 : anchoring prohibited</del> 2 : anchoring restricted <del>3 : fishing prohibited</del> 4 : fishing restricted <del>5 : trawling prohibited</del> 6 : trawling restricted <del>7 : entry prohibited</del> 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted <del>11 : diving prohibited</del> 12 : diving restricted <del>13 : no wake</del> <del>14 : area to be avoided</del> <del>16 : discharging prohibited</del> 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transshipment (lightening) prohibited 24 : dragging prohibited <del>25 : stopping prohibited</del> <del>26 : landing prohibited</del> 27 : speed restricted	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*

Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><u>INT 1 Reference:</u> N 43</p> <p><b>16.23.1 Territorial Seas (see S-4 – B-440.5)</b></p> <p>A Territorial Sea is delimited by:</p> <ul style="list-style-type: none"> <li>• Territorial Sea Baselines (drying lines);</li> <li>• Straight Territorial Sea Baselines (see clause X.X);</li> <li>• International maritime boundaries (see clause X.X); and</li> <li>• Seaward limits of Territorial Seas.</li> </ul> <p>Within the Territorial Sea, a coastal State exercises sovereignty subject to rules of international law, including the right of innocent passage for foreign ships.</p> <p>If it is required to encode a Territorial Sea area, it must be done using the <b>feature Territorial Sea Area</b>.</p> <p>In accordance with Article 55 of the United Nations Convention on the Law of the Sea (UNCLOS – 10 December 1982), a Coastal State's Territorial Sea Area and Exclusive Economic Zone must not overlap. Occasionally, small areas at the boundary of two or more Coastal States may be in dispute regarding the establishment of maritime jurisdiction, which may result in a small section of Territorial Sea overlapping an EEZ in the disputed area.</p> <p>Where issues of maritime jurisdiction between two or more Coastal States are in dispute, the proposed Territorial Sea (<b>Territorial Sea Area</b>) of one Coastal State may overlap the proposed EEZ (<b>Exclusive Economic Zone</b>) of another Coastal State. In this case, the disputed area should be encoded with overlapping <b>Territorial Sea Area</b> and <b>Exclusive Economic Zone features</b>, and S-58 (Recommended ENC Validation Checks) test 1700 may be ignored until the dispute is settled. Where an area is in dispute, a <b>Caution Area feature</b> should also be encoded covering the entire disputed area, with caution notes advising that the area is in dispute encoded using the <b>complex</b> attributes <b>information</b> and/or <b>textual description</b>.</p> <p><u>Remarks:</u></p> <ul style="list-style-type: none"> <li>• No remarks.</li> </ul> <p><u>Distinction:</u> Administrative area; Contiguous Zone; Continental Shelf area; Exclusive Economic Zone; fishery zone; restricted area.</p>				

## 16.24 Submarine transit lane

IHO Definition: <b>SUBMARINE TRANSIT LANE.</b> An area where submarines may navigate under water or at the surface. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.168, November 2000).				
<b>S-101 Geo Feature:</b> Submarine transit lane (SUBTLN)				
<b>Primitives:</b> Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 7 : entry prohibited 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 14 : area to be avoided 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transshipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 27 : speed restricted	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1

Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><b>INT 1 Reference:</b> N 33</p> <p><b>16.24.1 Submarine transit lanes (see S-4 – B-441.5)</b></p> <p>Submarine transit lanes should not generally be encoded because submarines exercise over wide areas which it would not be practicable to depict, and over which cautions (to keep a good look out for them) are unlikely to be effective. They may, however, be encoded where they occur in or near major shipping lanes or port approaches.</p> <p>If it is required to encode a submarine transit lane, it must be done using the <b>feature Submarine Transit Lane</b>.</p> <p><b>Remarks:</b></p> <ul style="list-style-type: none"> <li>• No remarks.</li> </ul> <p><b>Distinction:</b> Military practice area.</p>				

## 16.25 Restricted area

**IHO Definition:** **RESTRICTED AREA.** A specified area **on land or water** designated by an appropriate authority within which **access or navigation is restricted in accordance with certain specified conditions.** (Adapted from **IHO Dictionary – S-32**).

**Comment [j120]:** MD8 – 2.Co.2 and 2.Cl.2.

**Comment [j121]:** MD8 – 2.Co.2 and 2.Cl.2.

**S-101 Geo Feature: Restricted area (RESARE)****Primitives:** Surface*Real World**Paper Chart Symbol**ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of restricted area	(CATREA)	1 : offshore safety zone 4 : nature reserve 5 : bird sanctuary 6 : game reserve 7 : seal sanctuary 8 : degaussing range 9 : military area 10 : historic wreck area 12 : navigational aid safety zone 14 : minefield 18 : swimming area 19 : waiting area 20 : research area 21 : dredging area 22 : fish sanctuary 23 : ecological reserve 24 : no wake area 25 : swinging area 26 : water skiing area 27 : environmentally sensitive sea area 28 : particularly sensitive sea area 29 : disengagement area	EN	0,*
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 7 : entry prohibited	EN	0,*

**Comment [j122]:** S-57 Supplement No. 1.

**Comment [j123]:** S-57 Extension 06/01.



		8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 14 : area to be avoided 15 : construction prohibited 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transshipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 26 : landing prohibited 27 : speed restricted 28 : swimming prohibited		
Status	(STATUS)	1 : permanent 2 : occasional 3 : recommended 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 9 : mandatory 18 : existence doubtful 19 : buoyed	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<b>INT 1 Reference:</b> L 3, 5.2; M 29.1, N 2.1-2, 20-22, 25, 26, 31, 34, 63 <b>16.25.1 Restricted areas in general (see S-4 – B-431.4; B-435.7; B-435.11; B-437.1-7; B-439.2-4; B-445.9; B-448; B-448.1 and B-449.5)</b>				

**Comment [J124]:** S-57  
Extension 06/01.

**Comment [J125]:** S-57  
Extension 06/01.

There are many types of areas within which certain activities are discouraged or prohibited, or from which certain classes of vessels are excluded. The general term for all areas in which certain aspects of navigation may be restricted or prohibited by regulations is "Restricted Area", or equivalent. The word "prohibited", or its equivalent, may appear in terms relating to activities which are contrary to the regulations, e.g. "Anchoring Prohibited", "Entry Prohibited".

If it is required to encode a restricted area, it must be done using the **feature Restricted Area**, or using other **features** having the attribute **restriction** (**Anchorage Area**, **Cable Area**, **Dumping Ground**, **Dredged Area**, **Deep Water Route Part**, **Fairway**, **Fishing Ground**, **Harbour Facility**, **Incineration Area**, **Inshore Traffic Zone**, **Marine Farm/Culture**, **Military Practice Area**, **Offshore Production Area**, **Submarine Pipeline Area**, **Pipeline Submarine/On Land**, **Precautionary Area**, **Seaplane Landing Area**, **Submarine Transit Lane**, **Territorial Sea Area**, **Traffic Separation Scheme Crossing**, **Traffic Separation Scheme Lane Part**, **Traffic Separation Scheme Roundabout**).

Remarks:

- The attribute **category of restricted area** is used to describe the reason for the regulation, while the attribute **restriction** describes the restrictions.
- The complex attributes **information** or **textual description** are used to provide an additional explanation about the regulation (e.g. caution note from a paper chart), where required.
- The term "no anchoring area" is used to identify the IMO routing measure of that name. Such areas, where required, must be encoded as **Restricted Area** with attribute **restriction** = 1 (anchoring prohibited).
- If it is required to encode an area for which the mariner must be made aware of circumstances influencing the safety of navigation, it must be done using the **feature Caution Area** (see clause X.X). This **feature** may be used to identify a danger, a risk, a rule or advice (e.g. an area of continually changing depths) which is not directly related to a particular **feature**.

#### 16.25.1.1 Minefields (see S-4 – B-441.8)

If it is required to encode a minefield, it must be done using a **Restricted Area feature**, with attribute **category of restricted area** = 14 (minefield). Former mined areas should also be encoded with attribute **status** = 4 (not in use).

#### 16.25.1.2 Degaussing ranges (see S-4 – B-448)

A degaussing (or demagnetising) range is an area, usually of about 0.2M diameter, within which ships' magnetic fields may be measured. Sensing instruments and cables are installed on the sea floor in the range and there are cables leading from the range to a control position ashore. The range is usually marked by distinctive buoys. The significance of a degaussing range to mariners is that anchoring and trawling are prohibited and that the range may have to be avoided when vessels are using it.

If it is required to encode a degaussing range, it must be done using a **Restricted Area feature**, with attribute **category of restricted area** = 8 (degaussing range).

#### 16.25.1.3 Nature reserves (see S-4 – B-437.3)

If it is required to encode a marine nature reserve area, it must be done using a **Restricted Area feature**, with attribute **category of restricted area** = 4 (nature reserve).

#### 16.25.1.4 Speed limits (see S-4 – B-430.2)

Speed is often limited inside harbours in order to prevent wakes. If it is required to encode this restriction, it must be done using a **Restricted Area feature**, with the attribute **category of restricted area** = 24 (no wake area) or **restriction** = 13 (no wake). If it is required to encode cases where the speed limit is known, it must be done using **restriction** = 27 (speed restricted), with the speed limit and its unit of measurement encoded using the complex attribute **information** (e.g. *Speed limit is 5 knots*).

If it is required to encode the buoys/beacons marking the **Restricted Area feature** with speed limits, it must be done using **Beacon Special Purpose/General** or **Buoy Special Purpose/General features** (see clauses X.X, X.X), with the attribute **category of special purpose mark** = 24 ("reduced wake" mark) or 25 (speed limit mark). The speed limit and its unit of measurement should be encoded using the complex attribute **information** (e.g. *Speed limit is 6 knots*).

#### 16.25.1.5 Anchoring restricted (see S-4 – B-431.4)

If it is required to encode a restricted anchoring area, it must be done using a **Restricted Area feature**, or using other objects with the attribute **restriction** (see clause X.X), where **restriction** = 1 (anchoring prohibited), 2 (anchoring restricted) or 7 (entry prohibited). Additional information about the restriction should be encoded using the complex attribute **information** or **textual description**.

**16.25.1.6 Areas to be avoided (see S-4 – B-435.7)**

If it is required to encode an area to be avoided, it must be done using a **Restricted Area feature**, with attribute **restriction** = 14 (area to be avoided). An area to be avoided around a navigational aid must also be encoded with attribute **category of restricted area** = 12 (navigational aid safety zone).

**16.25.1.7 Environmentally Sensitive Sea Areas (see S-4 – B-437)**

Environmentally Sensitive Sea Areas (ESSA) should be included on ENC's where there is a specifically identified requirement, and where it is practicable, given the maximum display scale of the ENC data and the extent of the ESSA. If there is no such requirement, or if it is not practicable, details of ESSA should only be inserted in associated publications, such as Sailing Directions. It should be noted that the inclusion of ESSA on smaller maximum display scale of the ENC data may be appropriate for voyage planning purposes.

If it is required to encode an Environmentally Sensitive Sea Area, it must be done using a **Restricted Area feature**, with attribute **category of restricted area** = 27 (ESSA) or 28 (PSSA).

An Environmentally Sensitive Sea Area that is shown on the source as a point symbol should be encoded using a small **surface Restricted Area feature**.

Distinction: Anchorage area; cable area; caution area; Deep Water route **part**; depth area; dredged area; dumping ground; fairway; military practice area; pipeline area; swept area.

## 16.26 Pilotage district

<u>IHO Definition:</u> <b>PILOTAGE DISTRICT.</b> An area within which pilotage regulations apply. Definition?				
<u>S-101 Geo Feature:</u> Pilotage district				
<u>Primitives:</u> Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>		<i>ECDIS Symbol</i>	
<b>S-101 Attribute</b>	<b>S-57 Acronym</b>	<b>Allowable Encoding Value</b>	<b>Type</b>	<b>Multiplicity</b>
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale maximum	(SCAMAX)	scale maximum < scale minimum	IN	0,1
Scale minimum	(SCAMIN)	scale minimum > scale maximum	IN	0,1
Recording date	(RECDAT)		DA	0,1
Recording indication	(RECIND)		TE	0,1
Source date	(SORDAT)	ISO 8601:1988	DA	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<u>INT 1 Reference:</u>				
<b>16.26.1 Pilotage districts (see S-4 – B-XXX)</b>				
If it is required to encode the area within which regulations regarding pilotage apply it should be done using the feature <b>Pilotage District</b> .				
<u>Remarks:</u>				
<ul style="list-style-type: none"> <li>At least one of the complex attributes <b>information</b> or <b>textual description</b> must be populated for <b>Pilotage District</b> features.</li> <li>Where the limit of pilotage regulations are coincident with harbour or port limits it is not required to encode a</li> </ul>				

**Pilotage District** feature.

**Distinction:** Pilot boarding place

**Comment [r126]:** Association to Pilot boarding places?

**Comment [r127]:** Could add contact details complex attribute to carry comcha etc

## 17 Aids to Navigation - Overview

### 17.1 Geo features forming parts of navigational aids

Aids to navigation are composed of fixed or floating structure **features** carrying equipment **features**.

The most common structure **features** are: **Beacon Cardinal**, **Beacon Isolated Danger**, **Beacon Lateral**, **Beacon Safe Water**, **Beacon Special Purpose/General**, **Buoy Cardinal**, **Buoy Installation**, **Buoy Isolated Danger**, **Buoy Lateral**, **Buoy Safe Water**, **Buoy Special Purpose/General**, **Bridge**, **Building**, **Crane**, **Daymark**, **Floating Dock**, **Fortified Structure**, **Fishing Facility**, **Hulk**, **Light Float**, **Light Vessel**, **Landmark**, **Mooring/Warping Facility**, **Offshore Platform**, **Pile**, **Pontoon**, **Pylon/Bridge Support**, **Obstruction**, **Shoreline Construction**, **Wreck**.

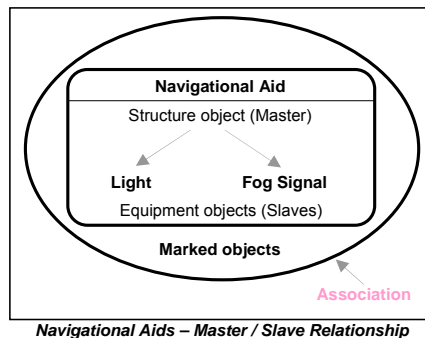
Equipment **features** consist of: **Daymark**, **Fog Signal**, **Light**, **Radar Station**, **Radio Station**, **Retroreflector**, **Radar Transponder Beacon**, **Signal Station Traffic**, **Signal Station Warning**, **Topmark**.

Radar reflectors must not be encoded as separate **features** when attached to navigational aids. If it is required to encode their existence, it must be done using the attribute **radar conspicuous**.

Rescue stations and coast guard stations are not related to navigation, and they must not, therefore, be part of the equipment **features** of navigational aids. If it is required to encode a rescue or coast guard station at the same location as a navigational mark, it must be encoded as a separate **feature**, and share the same **spatial type** as the navigational aid.

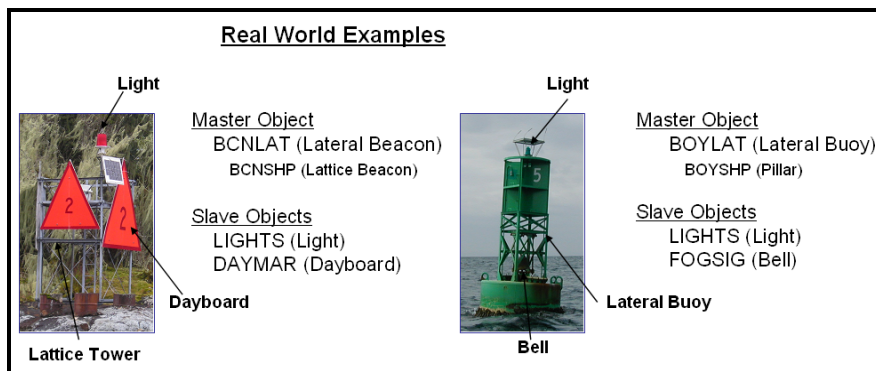
### 17.2 Relationships

A master to slave relationship must be created in order to relate the different **features** comprising a navigational aid. Where a master to slave relationship is created, there must be only one master (structure) **feature** related to one or more slave (equipment) **features**. A slave **feature** must not be related to more than one master **feature**, and a **feature** must not be both a master and a slave **feature**.



When the navigational aid contains a structure **feature** (from the list at clause 17.1), this **feature** must be the master **feature**, and the equipment **features** must be the slaves. Note that **Daymark** may be a master **feature** or a slave **feature**; where a navigational aid contains a **Daymark** and there is no other base structure (which can serve as the master **feature**) indicated on the source, the **Daymark feature** should be encoded as the master **feature**.

When the nature of the base structure on land is unknown or there is no structure object, one of the equipment **features** may be chosen as the master **feature**, giving priority to a **Light feature**, if one exists. Alternatively, a **Pile feature** of type point or a **Beacon Special Purpose/General feature** may be encoded as the structure **feature** at the same position as the equipment **features**. When the nature of the base structure in the water is unknown, an ECDIS Base Display **feature** (see S-52, Annex A, clause 13.2), e.g. **Pile feature** of type point or a **Beacon Special Purpose/General feature**, must be encoded as the structure **feature** at the same position as the equipment **features**.



#### Navigational Aids – Master / Slave Relationship: Real World Examples

In the above real world examples, the master and slave features that make up the navigational aids are point spatial types, and they must share the same geographic point spatial type.

If it is required to encode the name of the navigational aid, it must be done using the complex attribute **feature name** on the master **feature**. The name **must** not be repeated for the slave **features**. If the name is painted on the structure, it must be encoded with the same spelling in the complex attribute **feature name** (sub-attribute **name**, no value populated for sub-attribute **language**) if it is based on the Latin alphabet. If the name is not based on the Latin alphabet, it must be encoded using **feature name (name)**, with an appropriate value populated for the sub-attribute **language**, and transliterated for encoding on an iteration of **feature name (name)** with no value populated for **language**.

All point **features** comprising a navigational aid must share the same geographic point **spatial instance**.

The navigational aid may be associated with the **features** which it marks (e.g. to **Restricted Area** or **Obstruction features**) using the collection feature **C\_ASSO** (see clause XX). Several navigational aids and several marked **features** may be associated in the same relationship.

### 17.3 Buoyage systems and direction of buoyage (see S-4 – B-461)

Systems of buoyage are described as lateral, cardinal, or a combination of lateral and cardinal. Lateral systems depend on a direction of buoyage being defined. The cardinal system depends solely on the main points of the compass. Special purpose buoys often mark the limits or centre of an area (e.g. an exercise area, a dumping ground) and do not necessarily have lateral or cardinal system characteristics.

The IALA Maritime Buoyage System details, including the extent of Regions A and B, are given in other publications (e.g. UK's booklet NP 735 "IALA Maritime Buoyage System"). Although it is called a buoyage system, it applies to all fixed and floating marks except lighthouses, some sector lights, leading lights and marks, major floating lights and lights on offshore structures. Five types of marks are provided by the system: Lateral, Cardinal, Isolated danger, Safe water and Special marks, which may be used in any combination. Emergency Wreck Marking Buoys were added on a trial basis in 2006.

The buoyage system of the dataset and, where necessary, the direction of buoyage, must be encoded using the meta **feature Navigational System of Marks** (see clause X.X).

## 18 Lights

For the purpose of encoding lights in ENC, the following features must be used, depending on the type of light:

- **Light All Around/Single Sectored** (see clause X.X) for lights with a single sector (which includes lights having a 360° sector (all-around lights));
- **Sectored Light** (see clause X.X) for lights having two or more sectors which have different characteristics;
- **Directional Light** (see clause X.X) for single narrow sectored lights having a directional function;
- **Fog Detector Light** (see clause X.X) for lights used to automatically determine conditions of visibility which warrant the turning on or off of a sound signal; and
- **Air Obstruction Light** (see clause X.X) for lights marking an obstacle which constitutes a danger to air navigation.

When encoding a light, the combination of the character and purpose of the light must be evaluated in order to determine the most appropriate light feature from the above list.

### 18.1 Lights: General

#### 18.1.1 Rhythms of lights (see S-4 – B-471.2)

The principal character of a light is its rhythm (although, strictly, fixed lights and some alternating lights are not "rhythmic").

If it is required to encode the rhythms of lights, this must be done using the complex attribute **rhythm of light**, sub-attributes **light characteristic** and **signal group**. When populating **rhythm of light**, the sub-attributes **signal group**, **signal period** and **signal sequence** are only valid for non-fixed lights (i.e. sub-attribute **light characteristic** ≠ 1), with **signal group** and **signal period** being mandatory.

The use of these sub-attributes is defined in the following table; it contains the most common examples of coding; other coding combinations are possible:

Rhythms of lights	F	Oc	Oc(2)	Oc(2+3)	Iso	Fl	Fl(3)	LFI
<b>light characteristic</b>	1	8	8	8	7	2	2	3
<b>signal group</b>	<i>prohibited</i>	(1)	(2)	(2+3)	(1)	(1)	(3)	(1)

Rhythms of lights	Q	Q(3)	IQ	VQ	VQ(3)	IVQ	UQ	IUQ
<b>light characteristic</b>	4	4	9	5	5	10	6	11
<b>signal group</b>	(1)	(3)	( )	(1)	(3)	( )	(1)	( )

Rhythms of lights	Mo(K)	FFI	Q(6)+LFI	VQ(6)+LFI	AI.WR	AI.FI.WR	AI.FI(2W+1R)	AI.Oc(4)WR
<b>light characteristic</b>	12	13	25	26	28	19	19	17
<b>signal group</b>	(K)	(/)(1)	(6)(1)	(6)(1)	( )	(1)	(2+1)	(4)

Some lights recently constructed may appear to the mariner as "fixed and flashing - FFL" by night, while the real world feature actually comprises two separate lights vertically disposed, one fixed and the other flashing (F&FI). When it is known that two separate features actually exist, they must be encoded as **separate features**, in this case **two Light All Around/Single Sectored features**, one with complex attribute **rhythm of light**, sub-attribute **light characteristic** = 1 (fixed) and the other with **light characteristic** = 2 (flashing), and not as one **Light All Around/Single Sectored** with **light characteristic** = 13 (fixed/flash).

#### 18.1.2 Elevations of lights (see S-4 – B-471.6)

The elevation of a light is the vertical distance between the light source and the plane of reference for heights for the ENC data (see clause X.X).

If it is required to encode the elevation of a light on a fixed structure, it must be done using the attribute **height**.

If it is required to encode the height above the water surface of a light on a floating structure, it must be done using the complex attribute **information** on the **Light feature**.

#### 18.1.3 Times of exhibition and exhibition conditions (see S-4 – B-473)

##### 18.1.3.1 Night lights

If it is required to encode a night light, it must be done using the attribute **exhibition condition of light** = 4 (night light) on the **light feature**.

##### Unwatched lights (see S-4 – B-473.1)

This information should not be encoded, but unwatched (unmanned) lights, with no standby or emergency arrangements, may be encoded using attribute **status** = 17 (unwatched).



### 18.1.3.2 Occasional lights (see S-4 – B-473.2)

If it is required to encode an occasional light, it must be done using attribute **status** = 2 (occasional). If it is required to encode a private light that is not regularly exhibited, it must be done using **status** = 2,8 (occasional, private).

### 18.1.3.3 Daytime lights (see S-4 – B-473.4)

If it is required to encode a daytime light, it must be done using attribute **exhibition condition of light** = 1 (light shown without change of character).

If it is required to encode a light having characteristics shown by day different to those shown at night, it must be done by encoding **two light features** sharing the same point **spatial type**:

- **one light feature** with **exhibition condition of light** = 2 (daytime light),
- **one light feature** with **exhibition condition of light** = 4 (night light).

### 18.1.3.4 Fog lights (see S-4 – B-473.5)

If it is required to encode a light **which is exhibited in fog or conditions of reduced visibility**, it must be done using a **light feature**, with attributes **exhibition condition of light** = 3 (fog light) and **status** = 2 (occasional).

If it is required to encode a light having characteristics shown in fog that are different to those shown in conditions of normal visibility, it must be done by encoding **two light features** sharing the same point **spatial instance**:

- **one light feature** with **exhibition condition of light** = 3 (fog light) and **status** = 2 (occasional)
- **one light feature** with **exhibition condition of light** = 2 (daytime light) or 4 (night light) and **complex attribute information** (sub-attribute **text**) = *Character of the light changes in fog*.

Note the distinction between fog lights and fog detector lights, which are lights used to automatically determine conditions of visibility which warrant the turning on or off of a sound signal. Fog detector lights must be encoded, where required, using the feature **Light Fog Detector** (see clause X.X).

### 18.1.4 Leading lights (see S-4 – B-475.6)

If it is required to encode a leading light, it must be done using a **Light All Around/Single Sector** **feature**, with attribute:

**category of light** =  
 4,12 - front leading light  
 4,13 - rear leading light  
 4,14 - lower leading light  
 4,15 - upper leading light

#### Remarks:

- The attribute **orientation** must not be used for leading lights, except for directional lights.
- Even if, on the source, the leading lights are merged into a single symbol, a **Light All Around/Single Sector** **feature** must be created for each light. **These lights must be placed in their true position, i.e. where the source (e.g. paper chart) shows a single light with a legend such as 2F.Bu, further investigation must be done in order to determine the true position of each light, and its full attribution. Compilers should note that where this occurs on paper charts, the position of the light shown on the chart normally corresponds with the rear leading light.**
- The leading line must be encoded using the method described in clause X.X.

### 18.1.5 Lighthouses (see S-4 – B-457.3)

If it is required to encode a lighthouse, it must be done using a **Landmark feature** (see clause X.X), with attributes **category of landmark** = 17 (tower) and **function** = 33 (light support) for towers, or using a **Building feature** (see clause X.X), with the attribute **function** = 33, for any other shapes.

If it is required to encode the attributes **elevation**, **height** and **vertical length** for a lighthouse, this must be done as described in clause X.X.

If the lighthouse is permanently extinguished/unlit, this must be indicated by population of the attribute **status** = 4 (not in use) for the **Landmark/Building**, and the **light feature** must be removed. Where a lighthouse is illuminated by floodlights, the additional value of **status** = 12 (illuminated) must also be populated. For lights that are temporarily extinguished, see clause X.X.

### 18.1.6 Various special types of lights

Type	S-4	category of light	Remarks
Subsidiary light	B-471.8	10	

Type	S-4	category of light	Remarks
Aero light	B-476.1	5	
Air obstruction light	B-476.2	6	
Fog detector light	B-477		Encode using feature <b>Light Fog Detector</b>
Bearing light		18	
Flood light	B-478.2	8	Only to encode flood lights that are visible from seaward. The illuminated structure should be encoded using appropriate object classes, with attribute <b>status</b> = 12 (illuminated)
Synchronised lights	B-478.3		<b>status</b> = 15. Synchronised lights may be associated using the collection object <b>Association</b>
Strip light	B-478.5	9	See below for strip lights performing the function of an aid to navigation.
Spot light		11	Only to encode spot lights that are visible from seaward. The illuminated feature should be encoded using appropriate object classes, with attribute <b>status</b> = 12 (illuminated)
Emergency light		17	Must be encoded as a separate object to the main <b>Light</b> object
Horizontally disposed lights	B-471.8	19	The number of lights must be encoded using attribute <b>multiplicity of lights</b>
Vertically disposed lights	B-471.8	20	The number of lights must be encoded using attribute <b>multiplicity of lights</b>

For ECDIS display reasons, where an encoded strip light serves the purpose of an aid to navigation, the attribute **category of light** = 9 (strip light) for the **light feature** should not be populated. To identify that the aid to navigation is a strip light, the **complex** attribute **information** should be populated with *Strip light* or equivalent for the **light**.

#### 18.1.7 Light structures

**Light features located in the water must have a master structure object, generally a beacon (e.g. Beacon Lateral, Beacon Special Purpose/General) or other fixed structure (e.g. Offshore Platform), or a buoy structure (e.g. Buoy Lateral, Buoy Special Purpose/General) for floating aids to navigation. When a light is located in the water with no indication on the source of the structure feature, regardless of the height of the light, a Pile or Beacon Special Purpose/General feature should be encoded as the master feature.** This will ensure that a symbol will be shown on ECDIS systems when the **light features** are not displayed during daytime navigation.

## 18.2 Light all around/single sectored

**IHO Definition:** **LIGHT.** A light is a luminous or lighted aid to navigation. (IHO Dictionary – S-32).

An all around or single sectored light is a light with a single sector (which includes lights having a 360° sector), having no change in the characteristics of the light through the limit of the sector.

### **S-101 Geo Feature:** Light all around/single sectored (LIGHTS)

**Primitives:** Point

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of light	(CATLIT)	<del>1</del> : directional function 4 : leading light 5 : aero light <del>6</del> : air obstruction light <del>7</del> : fog detector light 8 : flood light 9 : strip light 10 : subsidiary light 11 : spotlight 12 : front 13 : rear 14 : lower 15 : upper <del>16</del> : moiré effect 17 : emergency 18 : bearing light 19 : horizontally disposed 20 : vertically disposed	EN	0,*
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow <del>7</del> : grey <del>8</del> : brown <del>9</del> : amber 10 : violet <del>11</del> : orange 12 : magenta <del>13</del> : pink	EN	1,*
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Exhibition condition of light	(EXCLIT)	1 : light shown without change of character 2 : daytime light 3 : fog light 4 : night light	EN	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name	(S) EN	0,1

		4 : short name 5 : display name		
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
Light visibility	(LITVIS)	1 : high intensity 2 : low intensity 3 : faint 4 : intensified 5 : unintensified 6 : visibility deliberately restricted 7 : obscured 8 : partially obscured 9 : visible in line of range	EN	0,*
Marks navigational – system of	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 10 : other system 11 : CEVNI	EN	0,1
Multiplicity of lights	(MLTYLT)		IN	0,1
Rhythm of light			C	1,1
Light characteristic	(LITCHR)	1 : fixed 2 : flashing 3 : long-flashing 4 : quick-flashing 5 : very quick-flashing 6 : ultra quick-flashing 7 : isophased 8 : occulting 9 : interrupted quick-flashing 10 : interrupted very quick flashing 11 : interrupted ultra quick flashing 12 : morse 13 : fixed and flash 14 : flash and long-flash 15 : occulting and flash 16 : fixed and long-flash 17 : occulting alternating 18 : long-flash alternating 19 : flash alternating 25 : quick-flash plus long-flash 26 : very quick-flash plus long flash 27 : ultra quick-flash plus long flash 28 : alternating 29 : fixed and alternating flashing	(S) EN	1,1
Signal group	(SIGGRP)		(S) IN	0,* (ordered)
Signal period	(SIGPER)		(S) RE	0,1
Signal sequence			(S) C	0,* (ordered)
Signal duration			(S) RE	1,1
Signal status		1 : lit 2 : eclipsed	(S) EN	1,1
Sector limit one	(SECTR1)		RE	0,1
Sector limit two	(SECTR2)		RE	0,1

Comment [j128]: MD8 – 8.CL8 and 8.Co.11.

Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 11 : extinguished 14 : public 15 : synchronized 16 : watched 17 : un-watched	EN	0,*
Value of nominal range	(VALNMR)		RE	0,1
Vertical datum	(VERDAT)	1 : Mean-low-water-springs 2 : Mean-lower-low-water-springs 3 : Mean sea level 4 : Lowest-low-water 5 : Mean-low-water 6 : Lowest-low-water-springs 7 : Approximate-mean-low-water-springs 8 : Indian-spring-low-water 9 : Low-water-springs 10 : Approximate-lowest-astronomical-tide 11 : Nearly-lowest-low-water 12 : Mean-lower-low-water 13 : Low-water 14 : Approximate-mean-low-water 15 : Approximate-mean-lower-low-water 16 : Mean high water 17 : Mean high water springs 18 : High water 19 : Approximate mean sea level 20 : High water springs 21 : Mean higher high water 22 : Equinoctial-spring-low-water 23 : Lowest-astronomical-tide 24 : Local datum 25 : International great lakes datum 1985 26 : Mean water level 27 : Lower-low-water-large-tide 28 : Higher high water large tide 29 : Nearly highest high water 30 : Highest astronomical tide (HAT)	EN	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1

Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

**INT 1 Reference:** P 1-65

**18.2.1 All-around and single sectored lights (see S-4 – B-470)**

If it is required to encode a light that consists of only one sector (excluding single sector directional, fog detector and air obstruction lights), it must be done using the feature **Light All Around/Single Sectored**. This feature must be a slave feature of a master feature (see clause X.X), which is either the structure feature, or another light feature at the same position (if it exists and there is no structure feature available).

The IALA Maritime Buoyage System rules do not apply for most landfall lights and will apply to minor lights, but not to leading lights, some sector lights or major floating lights. In general, sector lights follow IALA convention when used for marking a channel.

Further guidance for encoding various types and characteristics of lights can be found in clauses X.X to X.X.

**Remarks:**

- For all-around lights, the attributes **sector limit one** and **sector limit two** must not be populated.
- If it is required to encode details of the lighting technology (e.g. neon), it must be done using the complex attribute **information**.
- If it is required to encode the purpose of a marine spotlight, it must be done using **information**.
- The attribute **vertical datum** applies only to **height**; this value must only be encoded if it is different to the value encoded in the VDAT subfield of the "Coordinate Reference System Header field" [CRSH] field, or different to the value of **vertical datum** encoded on meta feature **Vertical Datum of Data**.
- Names of major lights are very important. If a light has a name which is unrelated to any other encoded feature, the name must be populated using the complex attribute **feature name** on at least the largest scale maximum display scale ENC data. If the name of a light is obviously that of the named feature on which the light stands, e.g. Saint Catherine's Point, the name of the light need not be repeated for the light.

**18.2.1.1 Types and functions of lights (see S-4 – B-471.1)**

If it is required to encode types and functions of lights, this must be done using the attribute **category of light** (see clause X.X).

**Distinction:** Beacon, cardinal; beacon, isolated danger; beacon, lateral; beacon, safe water; beacon, special purpose/general; buoy, cardinal; buoy, installation; buoy, isolated danger; buoy, lateral; buoy, safe water; buoy, special purpose/general; light air obstruction; light directional; light float; light fog detector; light multi-sectored; light vessel.

### 18.3 Light multi-sectored

**IHO Definition:** **LIGHT.** A light is a luminous or lighted aid to navigation. (IHO Dictionary – S-32).

A multi-sectored light is a light having two or more sectors which have different characteristics across, and sometimes within, each sector.

#### **S-101 Geo Feature:** Light multi-sectored (LIGHTS)

**Primitives:** Point

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
Light sector			C	2,*
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	(S) EN	1,*
Exhibition condition of light	(EXCLIT)	1 : light shown without change of character 2 : daytime light 3 : fog light 4 : night light	(S) EN	0,1
Directional			(S) BO	0,1
Light characteristic	(LITCHR)	1 : fixed 2 : flashing 3 : long-flashing 4 : quick-flashing 5 : very quick-flashing 6 : ultra quick-flashing 7 : isophased 8 : occulting	(S) EN	0,1

		9 : interrupted quick-flashing 10 : interrupted very quick flashing 11 : interrupted ultra quick flashing 12 : morse 13 : fixed and flash 14 : flash and long-flash 15 : occulting and flash 16 : fixed and long-flash 17 : occulting alternating 18 : long-flash alternating 19 : flash alternating 25 : quick-flash plus long-flash 26 : very quick-flash plus long flash 27 : ultra quick-flash plus long flash 28 : alternating 29 : fixed and alternating flashing		
Light visibility	(LITVIS)	1 : high intensity 2 : low intensity 3 : faint 4 : intensified 5 : unintensified 6 : visibility deliberately restricted 7 : obscured 8 : partially obscured 9 : visible in line of range	(S) EN	0,*
Orientation	(ORIENT)		(S) RE	0,1
Sector limit one	(SECTR1)		(S) RE	1,1
Sector limit two	(SECTR2)		(S) RE	1,1
Value of nominal range	(VALNMR)		(S) RE	0,1
Information			(S) C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Marks navigational – system of	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 10 : other system 11 : CEVNI	EN	0,1
Rhythm of light			C	1,1
Light characteristic	(LITCHR)	1 : fixed 2 : flashing 3 : long-flashing 4 : quick-flashing 5 : very quick-flashing 6 : ultra quick-flashing 7 : isophased 8 : occulting 9 : interrupted quick-flashing 10 : interrupted very quick flashing 11 : interrupted ultra quick flashing 12 : morse 13 : fixed and flash 14 : flash and long-flash 15 : occulting and flash 16 : fixed and long-flash	(S) EN	0,1

**Comment [j129]:** MD8 – 8.CL8 and 8.Co.11.

**Comment [j130]:** MD8 – 8.CL8 and 8.Co.11.

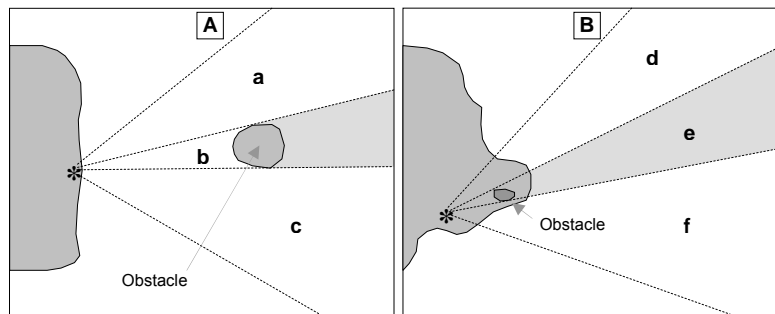


		17 : occulting alternating 18 : long-flash alternating 19 : flash alternating 25 : quick-flash plus long-flash 26 : very quick-flash plus long flash 27 : ultra quick-flash plus long flash 28 : alternating 29 : fixed and alternating flashing		
Signal group	(SIGGRP)		(S) IN	0,* (ordered)
Signal period	(SIGPER)		(S) RE	0,1
Signal sequence			(S) C	0,* (ordered)
Signal duration			(S) RE	1,1
Signal status		1 : lit 2 : eclipsed	(S) EN	1,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 11 : extinguished 14 : public 15 : synchronized 16 : watched 17 : un-watched	EN	0,*
Vertical datum	(VERDAT)	1-: Mean-low-water-springs 2-: Mean-lower-low-water-springs 3 : Mean sea level 4-: Lowest-low-water 5-: Mean-low-water 6-: Lowest-low-water-springs 7-: Approximate-mean-low-water-springs 8-: Indian-spring-low-water 9-: Low-water-springs 10-: Approximate-lowest-astronomical-tide 11-: Nearly-lowest-low-water 12-: Mean-lower-low-water 13-: Low-water 14-: Approximate-mean-low-water 15-: Approximate-mean-lower-low-water 16 : Mean high water 17 : Mean high water springs 18 : High water 19 : Approximate mean sea level 20 : High water springs 21 : Mean higher high water 22-: Equinoctial-spring-low-water 23-: Lowest-astronomical-tide 24 : Local datum 25 : International great lakes datum 1985 26 : Mean water level	EN	0,1

		27 : Lower-low water-large tide 28 : Higher high water large tide 29 : Nearly highest high water 30 : Highest astronomical tide (HAT)		
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><b>INT 1 Reference:</b> P 1-65</p> <p><b>18.3.1 Multi-sectored lights (see S-4 – B-475)</b></p> <p>If it is required to encode a light that consists of more than one sector, it must be done using the feature <b>Light Multi-sectored</b>. This feature must be a <b>slave feature</b> of a <b>master feature</b> (see clause X.X), which is either the structure feature, or another light feature at the same position (if it exists and there is no structure feature available).</p> <p>The IALA Maritime Buoyage System rules do not apply for most landfall lights and will apply to minor lights, but not to leading lights, some sector lights or major floating lights. In general, sector lights follow IALA convention when used for marking a channel.</p> <p>Further guidance for encoding various types and characteristics of lights can be found in clauses X.X to X.X.</p> <p><b>Remarks:</b></p> <ul style="list-style-type: none"> <li>• The complex attribute <b>light sector</b> is used to populate each sector for the light, except for sectors in which there is deliberately no light exhibited.</li> <li>• The sub-attribute <b>light characteristic</b> must be populated on either each iteration of the complex attribute <b>light sector</b> if sectors have different characteristics (e.g. for complex (oscillating) light sectors (see clause X.X.X.X below)), or on the complex attribute <b>rhythm of light</b> (if all sectors have the same characteristic).</li> <li>• If a sector of multi-sectored light is intended to have a directional function, this should be encoded using the <b>light sector</b> sub-attribute <b>orientation</b>. If the light is intensified in this sector, <b>light sector</b> sub-attribute <b>light visibility</b> = 4 (intensified) must be populated. A single sectored light having a directional function must be encoded using the feature <b>Light Directional</b> (see clause X.X).</li> <li>• The fairway defined by the succession of navigable areas in the white sectors of a series of <b>Light Multi-sectored</b> features may be encoded using the feature <b>Fairway</b> (see clause X.X).</li> <li>• If there is additional information required to be encoded that is relevant to all sectors of the light, this must be done using the complex attribute <b>information</b> for the <b>Light Multi-sectored</b> feature. If the additional information is relevant to individual sectors of the light only (e.g. for complex (oscillating) light sectors (see clause X.X.X.X below)), this must be encoded using the complex sub-attribute <b>information</b> for the complex attribute <b>light sector</b>.</li> <li>• If it is required to encode details of the lighting technology (e.g. neon), it must be done using the complex attribute <b>information</b>.</li> </ul>				

- The attribute **vertical datum** applies only to **height**; this value must only be encoded if it is different to the value encoded in the VDAT subfield of the "Coordinate Reference System Header field" [CRSH] field, or different to the value of **vertical datum** encoded on meta feature **Vertical Datum of Data**.
- Names of major lights are very important. If a light has a name which is unrelated to any other encoded feature, the name must be populated using the complex attribute **feature name** on at least the largest scale maximum display scale **ENC data**. If the name of a light is obviously that of the named feature on which the light stands, e.g. Saint Catherine's Point, the name of the light need not be repeated for the light.

#### 18.3.1.1 Lights obscured by obstructions (see S-4 – B-475.3)



If an encoded light is obscured in a part of the navigable area of a sector (see Figure A above) beyond an offshore obstruction, it must be encoded using **Light Multi-sectored**, with each of the sectors (a) – (c) encoded using the complex attribute **light sector**. The partially obscured sector of (b), seaward of the island, must have **light sector** with sub-attributes **light visibility** = 8 (partially obscured) and **information (text)** = *Sector obscured only beyond .....*. The sectors in which the light is visible from seaward ((a) and (c)) must be encoded as separate iterations of **light sector**.

If there is no navigable water between the light and the obstacle (see (e) in Figure B above), the masked sector must be encoded using **light sector**, with sub-attribute **light visibility** = 3 (faint) or 7 (obscured). The sectors in which the light is visible from seaward ((d) and (f)) must be encoded as separate iterations of **light sector**.

#### 18.3.1.2 Oscillating light sectors

Evolving technology in the development of navigational lights has resulted in the installation of complex directional navigation lights with multiple sectors, colours and characteristics, some with oscillating sectors, in many areas where navigation is restricted. These lights may have up to 7 sectors, with the central sector being a very narrow, sometimes intensified, fixed white sector performing the directional function of the light. In the IALA A System, the sectors flanking this directional light may be alternating and oscillate increasingly from white to green (to starboard) and red (to port) with increasing deviation from the track defined by the directional light. These lights will normally be flanked by narrow sectors of fixed green (to starboard) and red (to port). Additionally, there may be outer sectors that are occulting green (to starboard) and red (to port) which oscillate with increasing period of eclipse to isophased or flashing with increasing deviation from the track defined by the directional light. For the IALA B System the colours are reversed. In some cases these complex lights may not conform to IALA. Each of the outer sectors may be very narrow.

If is required to encode an oscillating light sector, it should be done using a **Light Multi-sectored** feature, with iterations of the complex attribute **light sector** as follows:

For light sectors in the IALA A system that are alternating and oscillate increasingly from white to green (to starboard) and red (to port) with increasing deviation from the track defined by the directional light:

**light sector:** **light characteristic** = 28 (Alternating); **colour** = 1,2 (White, Red); **sector limit one;** **sector limit two;** **information (text)** = *White phase decreases as bearing to light increases*

**light sector:** **light characteristic** = 28 (Alternating); **colour** = 1,4 (White, Green); **sector limit one;** **sector limit two;** **information (text)** = *White phase increases as bearing to light increases*

For lights in the IALA B system that are alternating and oscillate increasingly from white to red (to starboard) and green (to port) with increasing deviation from the track defined by the directional light; transpose the colours red and green in the above encoding.

For lights in the IALA A system that are occulting green (to starboard) and red (to port) which oscillate with

increasing period of eclipse to isophased or flashing with increasing deviation from the track defined by the directional light:

**light sector:** **light characteristic** = 8 (Occulting); **colour** = 3 (Red); **sector limit one;** **sector limit two;** **information (text)** = *Light phase decreases as bearing to light increases*

**light sector:** **light characteristic** = 8 (Occulting); **colour** = 4 (Green); **sector limit one;** **sector limit two;** **information (text)** = *Light phase increases as bearing to light increases*

For lights in the IALA B system that are occulting red (to starboard) and green (to port) which oscillate with increasing period of eclipse to isophased or flashing with increasing deviation from the track defined by the directional light; transpose the colours red and green in the above encoding.

Oscillating lights which are not IALA should be encoded similar to the above. For instance, where a light contains white sectors that are occulting and oscillate with increasing period of eclipse to isophased or flashing with increasing deviation from the track defined by the directional light:

For the sector to port of the track defined by the directional light:

**light sector:** **light characteristic** = 8 (Occulting); **colour** = 1 (White); **sector limit one;** **sector limit two;** **information (text)** = *Light phase decreases as bearing to light increases*

For the sector to starboard of the track defined by the directional light:

**light sector:** **light characteristic** = 8 (Occulting); **colour** = 1 (White); **sector limit one;** **sector limit two;** **information (text)** = *Light phase increases as bearing to light increases*

All other light sectors must be encoded using additional iterations of **light sector**, with sub-attributes (including **light characteristic**) populated in accordance with the characteristics of the sector.

Distinction: Beacon, cardinal; beacon, isolated danger; beacon, lateral; beacon, safe water; beacon, special purpose/general; buoy, cardinal; buoy, installation; buoy, isolated danger; buoy, lateral; buoy, safe water; buoy, special purpose/general; **light air obstruction**; **light all around/single sectored** ; **light directional**; light float; **light fog detector**; light vessel.

## 18.4 Light directional

<p><u>IHO Definition:</u> <b>DIRECTIONAL LIGHT.</b> A light is a luminous or lighted aid to navigation. (IHO Dictionary – S-32).</p> <p>A directional light is a light illuminating a sector of very narrow angle and intended to mark a direction to follow. (IHO Dictionary – S-32).</p>				
<b>S-101 Geo Feature:</b> Light directional (LIGHTS)				
<b>Primitives:</b> Point				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,*
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Exhibition condition of light	(EXCLIT)	1 : light shown without change of character 2 : daytime light 3 : fog light 4 : night light	EN	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
Light visibility	(LITVIS)	1 : high intensity 2 : low intensity 3 : faint 4 : intensified 5 : unintensified 6 : visibility deliberately restricted 7 : obscured 8 : partially obscured	EN	0,*

		9 : visible in line of range		
Marks-navigational—system of	(MARSYS)	1 : IALA-A 2 : IALA-B 9 : no system 10 : other system 11 : CEVNI	EN	0,1
Moiré effect			BO	0,1
Multiplicity of lights	(MLTYLT)		IN	0,1
Orientation	(ORIENT)		RE	1,1
Rhythm of light			C	1,1
Light characteristic	(LITCHR)	1 : fixed 2 : flashing 3 : long-flashing 4 : quick-flashing 5 : very quick-flashing 6 : ultra quick-flashing 7 : isophased 8 : occulting 9 : interrupted quick-flashing 10 : interrupted very quick flashing 11 : interrupted ultra quick flashing 12 : morse 13 : fixed and flash 14 : flash and long-flash 15 : occulting and flash 16 : fixed and long-flash 17 : occulting alternating 18 : long-flash alternating 19 : flash alternating 25 : quick-flash plus long-flash 26 : very quick-flash plus long flash 27 : ultra quick-flash plus long flash 28 : alternating 29 : fixed and alternating flashing	(S) EN	1,1
Signal group	(SIGGRP)		(S) IN	0,* (ordered)
Signal period	(SIGPER)		(S) RE	0,1
Signal sequence			(S) C	0,* (ordered)
Signal duration			(S) RE	1,1
Signal status		1 : lit 2 : eclipsed	(S) EN	1,1
Sector limit one	(SECTR1)		RE	0,1
Sector limit two	(SECTR2)		RE	0,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 11 : extinguished 14 : public 15 : synchronized 16 : watched 17 : un-watched	EN	0,*

Comment [j131]: MD8 – 8.Cl.8 and 8.Co.11.

Value of nominal range	(VALNMR)		RE	0,1
Vertical datum	(VERDAT)	1 : Mean low water springs 2 : Mean lower low water springs 3 : Mean sea level 4 : Lowest low water 5 : Mean low water 6 : Lowest low water springs 7 : Approximate mean low water springs 8 : Indian spring low water 9 : Low water springs 10 : Approximate lowest astronomical tide 11 : Nearly lowest low water 12 : Mean lower low water 13 : Low water 14 : Approximate mean low water 15 : Approximate mean lower low water 16 : Mean high water 17 : Mean high water springs 18 : High water 19 : Approximate mean sea level 20 : High water springs 21 : Mean higher high water 22 : Equinoctial spring low water 23 : Lowest astronomical tide 24 : Local datum 25 : International great lakes datum 1985 26 : Mean water level 27 : Lower low water large tide 28 : Higher high water large tide 29 : Nearly highest high water 30 : Highest astronomical tide (HAT)	EN	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: P 1-65

#### 18.4.1 Directional lights (see S-4 – B-470)

Directional (or direction) lights of several types are in use but all have in common a very narrow sector intended to mark a direction to be followed. The narrow sector may be flanked by:

- Unlit sectors or unintensified light.
- Sectors of different colour or character. Some direction lights are so precise that a complete colour change at a sector boundary occurs over an angle of less than 1 minute (0.02°). This corresponds to a lateral distance of just 1 metre at a viewing distance of 3.5 km. In addition the intensity may be maintained right to the edge of the beam, and does not reduce the further the observer is away from the axis.

A moiré effect mark (or variable arrow mark) is a short-range (normally up to 2 km) type of directional "light". Sodium lighting gives a yellow background to a screen (up to 3 m square) on which a vertical black line will be seen by an observer on the centreline, or variable arrow marks when course alteration is needed. The system can be used by day and night. It can also be used as a stop line (seen abeam) for vessels berthing along quays.

If it is required to encode a single narrow sectored light having a directional function, it must be done using the feature **Light Directional**. This feature must be a slave feature of a master feature (see clause X.X), which is either the structure feature, or another light feature at the same position (if it exists and there is no structure feature available).

The IALA Maritime Buoyage System rules do not apply for most landfall lights and will apply to minor lights, but not to leading lights, some sector lights or major floating lights. In general, sector lights follow IALA convention when used for marking a channel.

Further guidance for encoding various types and characteristics of lights can be found in clauses X.X to X.X.

#### Remarks:

- If it is required to encode a single sectored directional light that comprises a narrow (and sometimes intensified) sector, the sector must be encoded using the attributes **sector limit one** and **sector limit two**, and the mandatory attribute **orientation** must be populated with an empty (null) value.
- The mandatory attribute **orientation** must only be encoded to indicate the orientation, measured from seaward, of the leading line of the directional light when the attributes **sector limit one** and **sector limit two** are not populated, and there is no **Recommended Track** or **Navigation Line** feature associated with the directional light. Where the **Light Directional** has attributes **sector limit one** and **sector limit two**, and/or there is an associated **Recommended Track** and/or **Navigation Line**, **orientation** for the **Light Directional** must be populated with an empty (null) value.
- For moiré effect lights, the attribute **moiré effect** must be set to *True*.
- If it is required to encode details of the lighting technology (e.g. neon), it must be done using the complex attribute **information**.
- The attribute **vertical datum** applies only to **height**; this value must only be encoded if it is different to the value encoded in the VDAT subfield of the "Coordinate Reference System Header field" [CRSH] field, or different to the value of **vertical datum** encoded on meta feature **Vertical Datum of Data**.
- Names of major lights are very important. If a light has a name which is unrelated to any other encoded feature, the name must be populated using the complex attribute **feature name** on at least the largest scale maximum display scale **ENC data**. If the name of a light is obviously that of the named feature on which the light stands, e.g. Saint Catherine's Point, the name of the light need not be repeated for the light.
- If it is required to encode the recommended track and/or navigation line associated with a directional light, it must be done using the methods described in clause X.X.

Distinction: Beacon, cardinal; beacon, isolated danger; beacon, lateral; beacon, safe water; beacon, special purpose/general; buoy, cardinal; buoy, installation; buoy, isolated danger; buoy, lateral; buoy, safe water; buoy, special purpose/general; light air obstruction; light all around/single sectored; light float; light fog detector; light multi-sectored; light vessel.



## 18.5 Light fog detector

**IHO Definition:** **FOG DETECTOR LIGHT.** A light is a luminous or lighted aid to navigation. (IHO Dictionary – S-32).

A fog detector light is a light used to automatically determine conditions of visibility which warrant the turning on or off of a sound signal. (IHO Dictionary – S-32).

**S-101 Geo Feature:** Light fog detector (LIGHTS)

**Primitives:** Point

Real World	Paper Chart Symbol	ECDIS Symbol		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Exhibition-condition-of-light	(EXCLIT)	1 : light-shown-without change-of-character 2 : daytime-light 3 : fog-light 4 : night-light	EN	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
Light-visibility	(LITVIS)	1 : high-intensity 2 : low-intensity 3 : faint 4 : intensified 5 : unintensified 6 : visibility-deliberately restricted 7 : obscured 8 : partially-obscured 9 : visible-in-line-of-range	EN	0,*

Marks-navigational—system of	(MARSYS)	1 : IALA-A 2 : IALA-B 9 : no-system 10 : other-system 11 : CEVNI	EN	0,1
Multiplicity of lights	(MLTYLT)		IN	0,1
Rhythm of light			C	0,1
Light characteristic	(LITCHR)	1 : fixed 2 : flashing 3 : long-flashing 4 : quick-flashing 5 : very quick-flashing 6 : ultra quick-flashing 7 : isophased 8 : occulting 9 : interrupted quick-flashing 10 : interrupted very quick flashing 11 : interrupted ultra quick flashing 12 : morse 13 : fixed and flash 14 : flash and long-flash 15 : occulting and flash 16 : fixed and long-flash 17 : occulting alternating 18 : long-flash alternating 19 : flash alternating 25 : quick-flash plus long-flash 26 : very quick-flash plus long flash 27 : ultra quick-flash plus long flash 28 : alternating 29 : fixed and alternating flashing	(S) EN	1,1
Signal group	(SIGGRP)		(S) IN	0,* (ordered)
Signal period	(SIGPER)		(S) RE	0,1
Signal sequence			(S) C	0,* (ordered)
Signal duration			(S) RE	1,1
Signal status		1 : lit 2 : eclipsed	(S) EN	1,1
Sector-limit one	(SECTR1)		RE	0,1
Sector-limit two	(SECTR2)		RE	0,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 11 : extinguished 14 : public 15 : synchronized 16 : watched 17 : un-watched	EN	0,*
Value of nominal range	(VALNMR)		RE	0,1
Vertical datum	(VERDAT)	1 : Mean-low-water-springs 2 : Mean-lower-low-water springs	EN	0,1

Comment [j132]: MD8 – 8.CL8 and 8.Co.11.

		3 : Mean sea level 4 : Lowest-low-water 5 : Mean-low-water 6 : Lowest-low-water-springs 7 : Approximate-mean-low-water-springs 8 : Indian-spring-low-water 9 : Low-water-springs 10 : Approximate-lowest-astronomical-tide 11 : Nearly-lowest-low-water 12 : Mean-lower-low-water 13 : Low-water 14 : Approximate-mean-low-water 15 : Approximate-mean-lower-low-water 16 : Mean high water 17 : Mean high water springs 18 : High water 19 : Approximate mean sea level 20 : High water springs 21 : Mean higher high water 22 : Equinoctial-spring-low-water 23 : Lowest-astronomical-tide 24 : Local datum 25 : International great lakes datum 1985 26 : Mean water level 27 : Lower-low-water-large-tide 28 : Higher high water large tide 29 : Nearly highest high water 30 : Highest astronomical tide (HAT)		
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
INT 1 Reference: P 1-65 <b>18.5.1 Fog detector lights (see S-4 – B-470)</b> If it is required to encode a light used to automatically determine conditions of visibility which warrant the				

turning on or off of a sound signal, it must be done using the feature **Light Fog Detector**. This feature must be a slave feature of a master feature (see clause X.X), which is either the structure feature, or another light feature at the same position (if it exists and there is no structure feature available).

Further guidance for encoding various types and characteristics of lights can be found in clauses X.X to X.X.

**Remarks:**

- If it is required to encode details of the lighting technology (e.g. neon), it must be done using the complex attribute **information**.
- If it is required to encode the purpose of a marine spotlight, it must be done using **information**.
- The attribute **vertical datum** applies only to **height**; this value must only be encoded if it is different to the value encoded in the VDAT subfield of the "Coordinate Reference System Header field" [CRSH] field, or different to the value of **vertical datum** encoded on meta feature **Vertical Datum of Data**.

**Distinction:** Beacon, cardinal; beacon, isolated danger; beacon, lateral; beacon, safe water; beacon, special purpose/general; buoy, cardinal; buoy, installation; buoy, isolated danger; buoy, lateral; buoy, safe water; buoy, special purpose/general; light air obstruction; light all around/single sector; light directional; light float; light multi-sector; light vessel.

## 18.6 Light air obstruction

**IHO Definition:** **AIR OBSTRUCTION LIGHT.** A light is a luminous or lighted aid to navigation. (IHO Dictionary – S-32).

An air obstruction light is a light marking an obstacle which constitutes a danger to air navigation. (IHO Dictionary – S-32).

### **S-101 Geo Feature: Light air obstruction (LIGHTS)**

#### **Primitives: Point**

Real World	Paper Chart Symbol	ECDIS Symbol		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Exhibition condition of light	(EXCLIT)	1 : light shown without change of character 2 : daytime light 3 : fog light 4 : night light	EN	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
Light visibility	(LITVIS)	1 : high intensity 2 : low intensity 3 : faint 4 : intensified 5 : unintensified 6 : visibility deliberately restricted 7 : obscured 8 : partially obscured 9 : visible in line of range	EN	0,*

Marks-navigational—system of	(MARSYS)	1 : IALA-A 2 : IALA-B 9 : no-system 10 : other-system 11 : CEVNI	EN	0,1
Multiplicity of lights	(MLTYLT)		IN	0,1
Rhythm of light			C	0,1
Light characteristic	(LITCHR)	1 : fixed 2 : flashing 3 : long-flashing 4 : quick-flashing 5 : very quick-flashing 6 : ultra quick-flashing 7 : isophased 8 : occulting 9 : interrupted quick-flashing 10 : interrupted very quick flashing 11 : interrupted ultra quick flashing 12 : morse 13 : fixed and flash 14 : flash and long-flash 15 : occulting and flash 16 : fixed and long-flash 17 : occulting alternating 18 : long-flash alternating 19 : flash alternating 25 : quick-flash plus long-flash 26 : very quick-flash plus long flash 27 : ultra quick-flash plus long flash 28 : alternating 29 : fixed and alternating flashing	(S) EN	1,1
Signal group	(SIGGRP)		(S) IN	0,* (ordered)
Signal period	(SIGPER)		(S) RE	0,1
Signal sequence			(S) C	0,* (ordered)
Signal duration			(S) RE	1,1
Signal status		1 : lit 2 : eclipsed	(S) EN	1,1
Sector-limit one	(SECTR1)		RE	0,1
Sector-limit two	(SECTR2)		RE	0,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 11 : extinguished 14 : public 15 : synchronized 16 : watched 17 : un-watched	EN	0,*
Value of nominal range	(VALNMR)		RE	0,1
Vertical datum	(VERDAT)	1 : Mean-low-water-springs 2 : Mean-lower-low-water springs	EN	0,1

Comment [j133]: MD8 – 8.CL8 and 8.Co.11.

		3 : Mean sea level 4 : Lowest-low-water 5 : Mean-low-water 6 : Lowest-low-water-springs 7 : Approximate-mean-low-water-springs 8 : Indian-spring-low-water 9 : Low-water-springs 10 : Approximate-lowest-astronomical-tide 11 : Nearly-lowest-low-water 12 : Mean-lower-low-water 13 : Low-water 14 : Approximate-mean-low-water 15 : Approximate-mean-lower-low-water 16 : Mean high water 17 : Mean high water springs 18 : High water 19 : Approximate mean sea level 20 : High water springs 21 : Mean higher high water 22 : Equinoctial-spring-low-water 23 : Lowest-astronomical-tide 24 : Local datum 25 : International great lakes datum 1985 26 : Mean water level 27 : Lower-low-water-large-tide 28 : Higher high water large tide 29 : Nearly highest high water 30 : Highest astronomical tide (HAT)		
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><u>INT 1 Reference:</u> P 1-65</p> <p><b>18.6.1 Air obstruction lights (see S-4 – B-470)</b></p> <p>If it is required to encode a light marking an obstacle which constitutes a danger to air navigation, which may</p>				

also be used as a marine navigational aid, it must be done using the feature **Light Air Obstruction**. This feature must be a slave feature of a master feature (see clause X.X), which is either the structure feature, or another light feature at the same position (if it exists and there is no structure feature available).

Further guidance for encoding various types and characteristics of lights can be found in clauses X.X to X.X.

**Remarks:**

- If it is required to encode details of the lighting technology (e.g. neon), it must be done using the complex attribute **information**.
- The attribute **vertical datum** applies only to **height**; this value must only be encoded if it is different to the value encoded in the VDAT subfield of the "Coordinate Reference System Header field" [CRSH] field, or different to the value of **vertical datum** encoded on meta feature **Vertical Datum of Data**.

**Distinction:** Beacon, cardinal; beacon, isolated danger; beacon, lateral; beacon, safe water; beacon, special purpose/general; buoy, cardinal; buoy, installation; buoy, isolated danger; buoy, lateral; buoy, safe water; buoy, special purpose/general; light all around/single sector; light directional; light float; light fog detector; light multi-sector; light vessel.



## 19 Buoys, Beacons

### 19.1 Daymark

**IHO Definition:** **DAYMARK.** The identifying characteristics of an aid to navigation which serve to facilitate its recognition against a daylight viewing background. On those structures that do not by themselves present an adequate viewing area to be seen at the required distance, the aid is made more visible by affixing a daymark to the structure. A daymark so affixed has a distinctive colour and shape depending on the purpose of the aid. (IHO Dictionary – S-32, Edition 5).

**S-101 Geo Feature:** Daymark (DAYMAR)

**Primitives:** Point

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of special purpose mark	(CATSPM)	1 : firing danger area mark 2 : target mark 3 : marker ship mark 4 : degaussing range mark 5 : barge mark 6 : cable mark 7 : spoil ground mark 8 : outfall mark 9 : ODAS (Ocean-Data Acquisition-System) 10 : recording mark 11 : seaplane anchorage mark 12 : recreation zone mark 14 : mooring mark 15 : LANBY (Large Automatic Navigational Buoy) 16 : leading mark 17 : measured distance mark 18 : notice mark 19 : TSS mark (Traffic Separation Scheme) 20 : anchoring prohibited mark 21 : berthing prohibited mark 22 : overtaking prohibited mark 23 : two-way traffic prohibited mark 24 : reduced wake mark 25 : speed limit mark 26 : stop mark 27 : general warning mark 28 : sound ship's siren mark 29 : restricted vertical clearance mark 30 : maximum vessel's draught mark 31 : restricted horizontal clearance mark 32 : strong current warning mark	EN	0,*

**Comment [j134]:** MD8 – 7.Co.10.

		33 : berthing permitted mark 34 : overhead power cable mark 35 : channel edge gradient mark 36 : telephone mark 37 : ferry crossing mark 39 : pipeline mark 40 : anchorage mark 41 : clearing mark 42 : control mark 43 : diving mark 44 : refuge beacon 45 : foul ground mark 46 : yachting mark 47 : heliport mark 48 : GNSS mark 49 : seaplane landing mark 50 : control mark 51 : work in progress mark 52 : mark with unknown purpose 53 : wellhead mark 54 : channel separation mark 55 : marine farm mark 56 : artificial reef mark 57 : ice mark		
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Elevation	(ELEVAT)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1

Comment [J135]: S-57  
Extension 06/01.

Nature of construction	(NATCON)	1 : masonry 2 : concreted 4 : hard surfaced 6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted	EN	0,*
Status	(STATUS)	1 : permanent 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 12: illuminated	EN	0,*
Topmark/daymark shape	(TOPSHP)	1 : cone, point up 2 : cone, point down 3 : sphere 4 : 2 spheres 5 : cylinder (can) 6 : board 7 : x-shape (St. Andrew's cross) 8 : upright cross (St George's cross) 9 : cube, point up 10 : 2 cones, point to point 11 : 2 cones, base to base 12 : rhombus (diamond) 13 : 2 cones (points upward) 14 : 2 cones (points downward) 15 : besom, point up (broom or perch) 16 : besom, point down (broom or perch) 17 : flag 18 : sphere over rhombus 19 : square 20 : rectangle, horizontal 21 : rectangle, vertical 22 : trapezium, up 23 : trapezium, down 24 : triangle, point up 25 : triangle, point down 26 : circle 27 : two upright crosses (one over the other) 28 : T-shape 29 : triangle pointing up over a circle 30 : upright cross over a circle 31 : rhombus over a circle 32 : circle over a triangle pointing up 33 : other shape (see INFORM)	EN	0,1
Vertical length	(VERLEN)		RE	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1

Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: Q 101

#### 19.1.1 Daymarks (see S-4 – B-455.9)

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

The term "daymark" may also simply refer to any unlighted aid to navigation, and encoders may choose to encode **Daymark** instead of **Beacon Special Purpose/General**, particularly for leading marks (see clause X.X). In North America, the term "daybeacon" is used for an unlit beacon.

#### Remarks:

- The attribute **colour pattern** must be populated if more than one value is populated for the mandatory attribute **colour**.
- If it is required to encode the altitude of the ground level above the vertical datum at the position of a **daymark**, it must be done using the attribute **elevation**, but only for beacons built on land.
- If it is required to encode the total altitude of a **daymark**, including any equipment **features** (e.g. light), above the vertical datum, it must be done using the attribute **height**.
- If it is required to encode the total vertical length of a **daymark**, including any equipment **features** (e.g. light), above the seabed or ground, it must be done using the attribute **vertical length**.
- If it is required to encode a cairn that bears the colour(s) specified by a navigational system of marks, it must be done using a beacon **feature**.
- If it is required to encode a **daymark** that has more than one colour, the attributes **colour** and **colour pattern** must be encoded, according to the rules laid out in clause X.X.

Distinction: Beacon, cardinal; beacon, isolated danger; beacon, lateral; beacon, safe water; beacon, special purpose/general; topmark.

## 19.2 Lateral buoys

**IHO Definition: BUOY LATERAL MARKS.** A buoy is a floating object moored to the bottom in a particular place, as an aid to navigation or for other specific purposes. (IHO Dictionary – S-32).

A lateral buoy is used to indicate the port or starboard hand side of the route to be followed. They are generally used for well defined channels and are used in conjunction with a conventional direction of buoyage. (UKHO NP 735, 5<sup>th</sup> Edition).

### **S-101 Geo Feature: Buoy lateral (BOYLAT)**

#### **Primitives: Point**

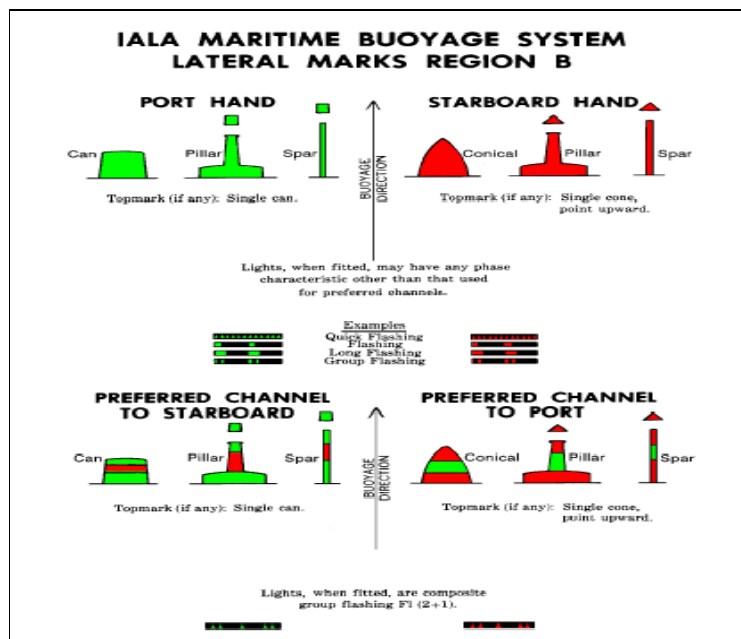
Real World		Paper Chart Symbol	ECDIS Symbol	
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Buoy shape	(BOYSHP)	1 : conical (nun, ogival) 2 : can (cylindrical) 3 : spherical 4 : pillar 5 : spar (spindle) 6 : barrel (tun) 7 : superbuoxy 8 : ice buoy	EN	1,1
Category of lateral mark	(CATLAM)	1 : port-hand lateral mark 2 : starboard-hand lateral mark 3 : preferred channel to starboard lateral mark 4 : preferred channel to port lateral mark	EN	1,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Feature name			C	0,*
Category of name		1 : official name	(S) EN	0,1

		2 : alternate name 3 : common name 4 : short name 5 : display name		
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Marks navigational – system of	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 10 : other system 11 : CEVNI	EN	0,1
Nature of construction	(NATCON)	6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 5 : periodic/intermittent 7 : temporary 8 : private 18 : existence doubtful	EN	0,*
Topmark	(TOPMAR)		C	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	(S) EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	(S) EN	0,1
Topmark/daymark shape	(TOPSHP)	1 : cone, point up 2 : cone, point down 3 : sphere 4 : 2 spheres 5 : cylinder (can) 6 : board 7 : x-shape (St. Andrew's cross) 8 : upright cross (St George's cross) 9 : cube, point up 10 : 2 cones, point to point 11 : 2 cones, base to base 12 : rhombus (diamond) 13 : 2 cones (points upward) 14 : 2 cones (points downward) 15 : besom, point up (broom or perch)	(S) EN	1,1

		16 : besom, point down (broom or perch) 17 : flag 18 : sphere over rhombus 19 : square 20 : rectangle, horizontal 21 : rectangle, vertical 22 : trapezium, up 23 : trapezium, down 24 : triangle, point up 25 : triangle, point down 26 : circle 27 : two upright crosses (one over the other) 27 : two upright crosses (one over the other) 28 : T-shape 29 : triangle pointing up over a circle 30 : upright cross over a circle 31 : rhombus over a circle 32 : circle over a triangle pointing up 33 : other shape (see INFORM)		
Vertical length	(VERLEN)		RE	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><b>INT 1 Reference:</b> Q 130.1</p> <p><b>19.2.1 Lateral buoys (see S-4 – B-461.3 and B-467)</b></p> <p>Lateral buoys are generally used for well defined channels, in conjunction with a direction of buoyage. They indicate the port and starboard sides of the route to be followed.</p> <p>To conform to the IALA Maritime Buoyage System (see clause X.X), port hand buoys are usually can, but may be another shape (except conical or spherical). Other shaped buoys have a can topmark. The colour of port hand buoys, topmarks and lights (if fitted) will be red in IALA region A and green in IALA region B.</p> <p>To conform to the IALA Maritime Buoyage System, starboard hand buoys are usually conical, but may be another shape (except can or spherical). Other shaped buoys have a conical topmark. The colour of starboard hand buoys, topmarks and lights (if fitted) will be green in IALA region A and red in IALA region B.</p> <p>A preferred channel mark is a modified lateral mark, with horizontal colour bands. The shape and</p>				

predominant colour indicates which side is the preferred channel, the other colour indicates the secondary channel. If fitted, the light is Fl(2+1), the colour indicating the preferred channel.

If it is required to encode a buoy having the function of a lateral mark, it must be done using the feature **Buoy Lateral**.



#### Remarks:

- The attribute **colour pattern** must be populated if more than one value is populated for the mandatory attribute **colour**.
- For the complex attribute **topmark**, the sub-attribute **colour pattern** must be populated if more than one value is populated for the mandatory sub-attribute **colour**.
- If it is required to encode the total vertical length, including the topmark and any equipment features (e.g. light), of the buoy above the water level, it must be done using the attribute **vertical length**.

**Distinction:** Buoy, cardinal; buoy, emergency wreck marking; buoy, installation; buoy, isolated danger; buoy, safe water; buoy, special purpose/general; mooring/warping facility.



### 19.3 Isolated danger buoys

<p>IHO Definition: <b>BUOY, ISOLATED DANGER</b>. A buoy is a floating object moored to the bottom in a particular place, as an aid to navigation or for other specific purposes. (IHO Dictionary – S-32).</p> <p>An isolated danger buoy is a buoy moored on or above an isolated danger of limited extent, which has navigable water all around it. (UKHO NP 735, 5<sup>th</sup> Edition).</p>				
<b>S-101 Geo Feature: Buoy isolated danger (BOYISD)</b>				
<b>Primitives:</b> Point				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Buoy shape	(BOYSHP)	1 : conical (nun, ogival) 2 : can (cylindrical) 3 : spherical 4 : pillar 5 : spar (spindle) 6 : barrel (tun) 7 : <i>superbuoy</i> 8 : ice buoy	EN	1,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
<i>Date range</i>			C	0,2
<i>Date end</i>		ISO 8601:1988	(S) DA	0,1
<i>Date start</i>		ISO 8601:1988	(S) DA	0,1
<i>Periodic</i>			(S) BO	0,1
<i>Feature name</i>			C	0,*
<i>Category of name</i>		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
<i>Language</i>		ISO 639-3	(S) TE	0,1
<i>Name</i>	(OBJNAM)		(S) TE	1,1

Marks navigational – system of	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 10 : other system 11 : CEVNI	EN	0,1
Nature of construction	(NATCON)	6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 12 : illuminated 18 : existence doubtful	EN	0,*
Topmark	(TOPMAR)		C	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	(S) EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	(S) EN	0,1
Topmark/daymark shape	(TOPSHP)	1 : cone, point up 2 : cone, point down 3 : sphere 4 : 2 spheres 5 : cylinder (can) 6 : board 7 : x-shape (St. Andrew's cross) 8 : upright cross (St George's cross) 9 : cube, point up 10 : 2 cones, point to point 11 : 2 cones, base to base 12 : rhombus (diamond) 13 : 2 cones (points upward) 14 : 2 cones (points downward) 15 : besom, point up (broom or perch) 16 : besom, point down (broom or perch) 17 : flag 18 : sphere over rhombus 19 : square 20 : rectangle, horizontal	(S) EN	1,1

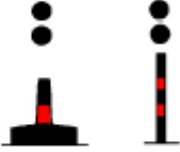
		21 : rectangle, vertical 22 : trapezium, up 23 : trapezium, down 24 : triangle, point up 25 : triangle, point down 26 : circle 27 : two upright crosses (one over the other) 27 : two upright crosses (one over the other) 28 : T-shape 29 : triangle pointing up over a circle 30 : upright cross over a circle 31 : rhombus over a circle 32 : circle over a triangle pointing up 33 : other shape (see INFORM)		
Vertical length	(VERLEN)		RE	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><b>INT 1 Reference:</b> Q 130.4</p> <p><b>19.3.1 Isolated danger buoys (see S-4 – B-461.3 and B-467)</b></p> <p>Isolated danger buoys are moored above isolated dangers of limited extent with navigable water all around them.</p> <p>The shape of isolated danger buoys is not significant (although they are usually pillar or spar). To conform to the IALA Maritime Buoyage System (see clause X.X), the body is black, with one or more red bands. Black double-sphere topmarks are an important feature of isolated danger buoys and carried wherever practicable. The light (if fitted) is white Fl(2).</p> <p>If it is required to encode a buoy having the function of an isolated danger mark, it must be done using the feature <b>Buoy Isolated Danger</b>.</p>				

## IALA MARITIME BUOYAGE SYSTEM REGIONS A AND B


### ISOLATED DANGER MARKS

Topmarks are always fitted (when practicable).

Shape: Optional, but not conflicting with lateral marks; pillar or spar preferred.



Light, when fitted, is white Group Flashing(2)

 Fl (2)

**Remarks:**

- The attribute **colour pattern** must be populated if more than one value is populated for the mandatory attribute **colour**.
- For the complex attribute **topmark**, the sub-attribute **colour pattern** must be populated if more than one value is populated for the mandatory sub-attribute **colour**.
- If it is required to encode the total vertical length, including the topmark and any equipment features (e.g. light), of the buoy above the water level, it must be done using the attribute **vertical length**.

**Distinction:** Buoy, cardinal; buoy, emergency wreck marking; buoy, installation; buoy, lateral; buoy, safe water; buoy, special purpose/general; mooring/warping facility.

## 19.4 Lateral beacons

**IHO Definition:** **BEACON LATERAL.** A beacon is a prominent specially constructed object forming a conspicuous mark as a fixed aid to navigation or for use in hydrographic survey. (IHO Dictionary – S-32).

A lateral beacon is used to indicate the port or starboard hand side of the route to be followed. They are generally used for well defined channels and are used in conjunction with a conventional direction of buoyage. (UKHO NP 735, 5<sup>th</sup> Edition).

### **S-101 Geo Feature:** Beacon lateral (BCNLAT)

#### **Primitives:** Point

Real World		Paper Chart Symbol	ECDIS Symbol	
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Beacon shape	(BCNSHP)	1 : stake, pole, perch, post 2 : withy 3 : beacon tower 4 : lattice beacon 5 : pile beacon 6 : cairn 7 : buoyant beacon	EN	1,1
Category of lateral mark	(CATLAM)	1 : port-hand lateral mark 2 : starboard-hand lateral mark 3 : preferred channel to starboard lateral mark 4 : preferred channel to port lateral mark	EN	1,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Condition	(COND TN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1

Elevation	(ELEVAT)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
Marks navigational – system of	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 10 : other system 11 : CEVNI	EN	0,1
Nature of construction	(NATCON)	1 : masonry 2 : concreted 6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 12 : illuminated 18 : existence doubtful	EN	0,*
Topmark	(TOPMAR)		C	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	(S) EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	(S) EN	0,1
Topmark/daymark shape	(TOPSHP)	1 : cone, point up 2 : cone, point down 3 : sphere 4 : 2 spheres 5 : cylinder (can) 6 : board 7 : x-shape (St. Andrew's cross) 8 : upright cross (St	(S) EN	1,1

		George's cross) 9 : cube, point up 10 : 2 cones, point to point 11 : 2 cones, base to base 12 : rhombus (diamond) 13 : 2 cones (points upward) 14 : 2 cones (points downward) 15 : besom, point up (broom or perch) 16 : besom, point down (broom or perch) 17 : flag 18 : sphere over rhombus 19 : square 20 : rectangle, horizontal 21 : rectangle, vertical 22 : trapezium, up 23 : trapezium, down 24 : triangle, point up 25 : triangle, point down 26 : circle 27 : two upright crosses (one over the other) 27 : two upright crosses (one over the other) 28 : T-shape 29 : triangle pointing up over a circle 30 : upright cross over a circle 31 : rhombus over a circle 32 : circle over a triangle pointing up 33 : other shape (see INFORM)		
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<b>INT 1 Reference:</b> Q 91-92, 130.1 <b>19.4.1 Lateral Beacons (see S-4 – B-461.3 and B-467)</b>				

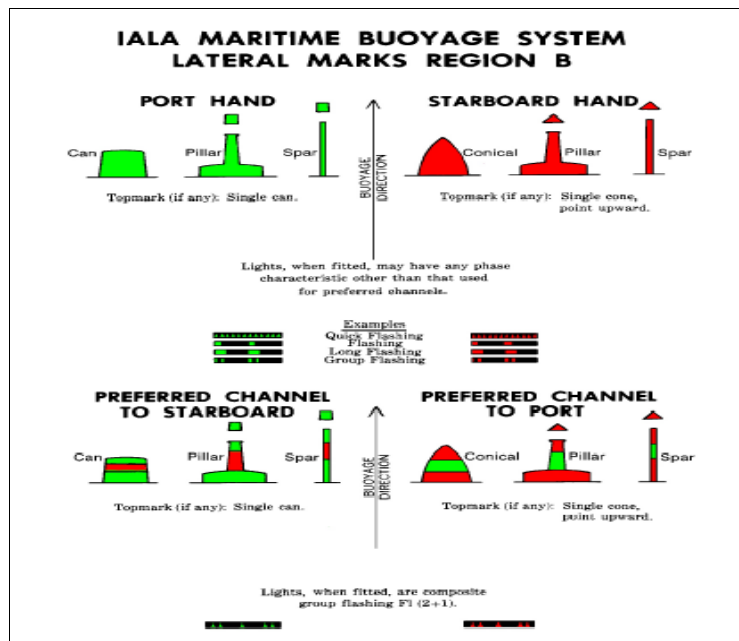
Lateral beacons are generally used for well defined channels, in conjunction with a direction of buoyage. They indicate the port and starboard sides of the route to be followed.

To conform to the IALA Maritime Buoyage System (see clause X.X), port hand beacons have a can topmark. The colour of port hand beacons, topmarks and lights (if fitted) will be red in IALA region A and green in IALA region B.

To conform to the IALA Maritime Buoyage System, starboard hand beacons have a conical topmark. The colour of starboard hand beacons, topmarks and lights (if fitted) will be green in IALA region A and red in IALA region B.

A preferred channel beacon is a modified lateral beacon, with horizontal colour bands. The predominant colour indicates which side is the preferred channel, the other colour indicates the secondary channel. If fitted, the light is Fl(2+1), the colour indicating the preferred channel.

If it is required to encode a beacon having the function of a lateral mark, it must be done using the feature **Beacon Lateral**.



#### Remarks:

- The attribute **colour pattern** must be populated if more than one value is populated for the mandatory attribute **colour**.
- For the complex attribute **topmark**, the sub-attribute **colour pattern** must be populated if more than one value is populated for the mandatory sub-attribute **colour**.
- If it is required to encode the altitude of the ground level above the vertical datum at the position of a beacon, it must be done using the attribute **elevation**, but only for beacons built on land.
- If it is required to encode the total altitude of a beacon, including the topmark and any equipment features (e.g. light), above the vertical datum, it must be done using the attribute **height**.
- If it is required to encode the total vertical length of a beacon, including the topmark and any equipment features (e.g. light), above the seabed or ground, it must be done using the attribute **vertical length**.
- If it is required to encode a cairn that bears the colour(s) specified by a navigational system of marks, it must be done using a beacon **feature**.

**Distinction:** Beacon, cardinal; beacon, isolated danger; beacon, safe water; beacon, special purpose/general; daymark.



## 19.5 Special purpose/general beacons

**IHO Definition: BEACON SPECIAL PURPOSE/GENERAL.** A beacon is a prominent specially constructed object forming a conspicuous mark as a fixed aid to navigation or for use in hydrographic survey. (IHO Dictionary – S-32).

A special purpose beacon is primarily used to indicate an area or feature, the nature of which is apparent from reference to a chart, Sailing Directions or Notices to Mariners. (UKHO NP 735, 5<sup>th</sup> Edition).

Beacon in general: A buoy whose appearance or purpose is not adequately known. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.12, November 2000).

### **S-101 Geo Feature: Beacon Special Purpose/General (BCNSPP)**

#### **Primitives: Point**

Real World	Paper Chart Symbol	ECDIS Symbol		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Beacon shape	(BCNSHP)	1 : stake, pole, perch, post 2 : withy 3 : beacon tower 4 : lattice beacon 5 : pile beacon 6 : cairn 7 : buoyant beacon	EN	1,1
Category of special purpose mark	(CATSPM)	1 : firing danger area mark 2 : target mark 3 : marker ship mark 4 : degaussing range mark 5 : barge mark 6 : cable mark 7 : spoil ground mark 8 : outfall mark 9 : ODAS (Ocean-Data Acquisition-System) 10 : recording mark 11 : seaplane anchorage mark 12 : recreation zone mark 14 : mooring mark 15 : LANBY (Large Automatic Navigational Buoy) 16 : leading mark 17 : measured distance mark 18 : notice mark 19 : TSS mark (Traffic Separation Scheme) 20 : anchoring prohibited mark 21 : berthing prohibited mark 22 : overtaking prohibited mark 23 : two-way traffic prohibited mark 24 : reduced wake mark 25 : speed limit mark 26 : stop mark 27 : general warning mark 28 : sound ship's siren mark	EN	1,*

**Comment [j136]:** MD8 – 7.Co.10.

		29 : restricted vertical clearance mark 30 : maximum vessel's draught mark 31 : restricted horizontal clearance mark 32 : strong current warning mark 33 : berthing permitted mark 34 : overhead power cable mark 35 : channel edge gradient mark 36 : telephone mark 37 : ferry crossing mark 39 : pipeline mark 40 : anchorage mark 41 : clearing mark 42 : control mark 43 : diving mark 44 : refuge beacon 45 : foul ground mark 46 : yachting mark 47 : heliport mark 48 : GNSS mark 49 : seaplane landing mark 50 : control mark 51 : work in progress mark 52 : mark with unknown purpose 53 : wellhead mark 54 : channel separation mark 55 : marine farm mark 56 : artificial reef mark 57 : ice mark		
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Elevation	(ELEVAT)		RE	0,1

**Comment [j137]:** S-57  
Extension 06/01.

Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
Marks navigational – system of	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 10 : other system 11 : CEVNI	EN	0,1
Nature of construction	(NATCON)	1 : masonry 2 : concreted 6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 12 : illuminated 18 : existence doubtful	EN	0,*
Topmark	(TOPMAR)		C	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	(S) EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	(S) EN	0,1
Topmark/daymark shape	(TOPSHP)	1 : cone, point up 2 : cone, point down 3 : sphere 4 : 2 spheres 5 : cylinder (can) 6 : board 7 : x-shape (St. Andrew's cross) 8 : upright cross (St George's cross) 9 : cube, point up	(S) EN	1,1

		10 : 2 cones, point to point 11 : 2 cones, base to base 12 : rhombus (diamond) 13 : 2 cones (points upward) 14 : 2 cones (points downward) 15 : besom, point up (broom or perch) 16 : besom, point down (broom or perch) 17 : flag 18 : sphere over rhombus 19 : square 20 : rectangle, horizontal 21 : rectangle, vertical 22 : trapezium, up 23 : trapezium, down 24 : triangle, point up 25 : triangle, point down 26 : circle 27 : two upright crosses (one over the other) 27 : two upright crosses (one over the other) 28 : T-shape 29 : triangle pointing up over a circle 30 : upright cross over a circle 31 : rhombus over a circle 32 : circle over a triangle pointing up 33 : other shape (see INFORM)		
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<b>INT 1 Reference:</b> Q 130.6 <b>19.5.1 Special purpose/general beacons (see S-4 – B-461.3 and B-467)</b> Special beacons are used to indicate to the mariner a special area or feature, the nature of which is usually				

apparent from the chart or associated publication.

To conform to the IALA Maritime Buoyage System (see clause X.X), the body of the beacon is yellow. The topmark (if fitted) is a yellow diagonal 'X' (St Andrew's cross). Lights (if fitted) are yellow and of any rhythm except those used for cardinal, isolated danger and safe water marks.

If it is required to encode a beacon having the function of a special purpose mark, or a beacon whose appearance or purpose is inadequately known, it must be done using the feature **Beacon Special Purpose/General**.

In the following table, the symbol '/' indicates that this attribute does not exist for that particular feature. A blank indicates that the encoder may choose a relevant value for the attribute. The table contains the most common examples of coding; other coding combinations are possible.

Feature	INT1	Feature	beacon shape	category of special purpose mark	Other attributes
Minor not permanent mark	Q90	Beacon ***	1		
	Q91	Beacon Lateral	1	/	
	Q92	Beacon Lateral	2	/	
Cairn	Q100	Beacon ***	6		
Coloured or white mark	Q101	Daymark	/		nature of construction = 9
Coloured topmark with function of beacon	Q102.1	Daymark	/		nature of construction = 9
Painted board with function of leading beacon	Q102.2	Daymark	/	16	nature of construction = 9, topmark shape = 6
Beacon tower	Q110	Beacon ***	3		
Lattice beacon	Q111	Beacon ***	4		
Leading beacon	Q120	Beacon Special Purpose/General		16	
Beacon marking a clearing line	Q121	Beacon Special Purpose/General		41	
Beacon marking measured distance	Q122	Beacon Special Purpose/General		17	
Cable landing beacon	Q123	Beacon Special Purpose/General		6	
Outfall landing beacon	Q123	Beacon Special Purpose/General		8	
Pipeline landing beacon	Q123	Beacon Special Purpose/General		39	
Refuge beacon	Q124	Beacon Special Purpose/General		44	
Firing practice area beacon	Q125	Beacon Special Purpose/General		1	
Notice board	Q126	Beacon Special Purpose/General		18	
Buoyant beacon	P5	Beacon Special Purpose/General	7		

**Remarks:**

- The attribute **colour pattern** must be populated if more than one value is populated for the mandatory attribute **colour**.
- For the complex attribute **topmark**, the sub-attribute **colour pattern** must be populated if more than one value is populated for the mandatory sub-attribute **colour**.
- If it is required to encode the altitude of the ground level above the vertical datum at the position of a beacon, it must be done using the attribute **elevation**, but only for beacons built on land.
- If it is required to encode the total altitude of a beacon, including the topmark and any equipment features

(e.g. light), above the vertical datum, it must be done using the attribute **height**.

- If it is required to encode the total vertical length of a beacon, including the **topmark** and any equipment **features** (e.g. light), above the seabed or ground, it must be done using the attribute **vertical length**.
- If it is required to encode a cairn that bears the colour(s) specified by a navigational system of marks, it must be done using a beacon **feature**.

#### 19.5.2 Signs and notice boards

If it is required to encode a fixed or floating sign or notice board, it must be done using a **Beacon Special Purpose/General feature** or **Buoy Special Purpose/General feature** (see clause X.X), with attribute **category of special purpose mark** = 18 (notice mark), or using the **feature Daymark** (see clause X.X).

Remarks:

- If it is required to encode a sign or notice board that has more than one colour, the attributes **colour** and **colour pattern** must be used, according to the rules laid out in clause X.X.
- If it is required to encode any text shown on a notice board or sign, it must be done using the **complex** attribute **information**.
- If it is required to encode the shape and colour of a notice board, it must be done by encoding the board as a **Daymark feature**.

Distinction: Beacon, cardinal; beacon, isolated danger; beacon, lateral; beacon, safe water; daymark.

## 19.6 Special purpose/general buoys

**IHO Definition: BUOY, SPECIAL PURPOSE/GENERAL.** A buoy is a floating object moored to the bottom in a particular place, as an aid to navigation or for other specific purposes. (IHO Dictionary – S-32).

A special purpose buoy is primarily used to indicate an area or feature, the nature of which is apparent from reference to a chart, Sailing Directions or Notices to Mariners. (UKHO NP 735, 5<sup>th</sup> Edition).

Buoy in general: A buoy whose appearance or purpose is not adequately known. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.24, November 2000).

**S-101 Geo Feature: Buoy special purpose/general (BOYSPP)**

**Primitives: Point**

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Buoy shape	(BOYSHP)	1 : conical (nun, ogival) 2 : can (cylindrical) 3 : spherical 4 : pillar 5 : spar (spindle) 6 : barrel (tun) 7 : superbuoy 8 : ice buoy	EN	1,1
Category of special purpose mark	(CATSPM)	1 : firing danger area mark 2 : target mark 3 : marker ship mark 4 : degaussing range mark 5 : barge mark 6 : cable mark 7 : spoil ground mark 8 : outfall mark 9 : ODAS (Ocean-Data Acquisition-System) 10 : recording mark 11 : seaplane anchorage mark 12 : recreation zone mark 14 : mooring mark 15 : LANBY (Large Automatic Navigational Buoy) 16 : leading mark 17 : measured distance mark 18 : notice mark 19 : TSS mark (Traffic Separation Scheme) 20 : anchoring prohibited mark 21 : berthing prohibited mark 22 : overtaking prohibited mark 23 : two-way traffic prohibited mark 24 : reduced wake mark 25 : speed limit mark 26 : stop mark 27 : general warning mark 28 : sound ship's siren mark	EN	1,*

**Comment [j138]:** MD8 – 7.Co.10.

		29 : restricted vertical clearance mark 30 : maximum vessel's draught mark 31 : restricted horizontal clearance mark 32 : strong current warning mark 33 : berthing permitted mark 34 : overhead power cable mark 35 : channel edge gradient mark 36 : telephone mark 37 : ferry crossing mark 39 : pipeline mark 40 : anchorage mark 41 : clearing mark 42 : control mark 43 : diving mark 44 : refuge beacon 45 : foul ground mark 46 : yachting mark 47 : heliport mark 48 : GNSS mark 49 : seaplane landing mark 50 : control mark 51 : work in progress mark 52 : mark with unknown purpose 53 : wellhead mark 54 : channel separation mark 55 : marine farm mark 56 : artificial reef mark 57 : ice mark		
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name	(S) EN	0,1

**Comment [j139]:** S-57 Extension 06/01.



		4 : short name 5 : display name		
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Marks navigational – system of	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 10 : other system 11 : CEVNI	EN	0,1
Nature of construction	(NATCON)	6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 5 : periodic/intermittent 7 : temporary 8 : private 18 : existence doubtful	EN	0,*
Topmark	(TOPMAR)		C	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	(S) EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	(S) EN	0,1
Topmark/daymark shape	(TOPSHP)	1 : cone, point up 2 : cone, point down 3 : sphere 4 : 2 spheres 5 : cylinder (can) 6 : board 7 : x-shape (St. Andrew's cross) 8 : upright cross (St George's cross) 9 : cube, point up 10 : 2 cones, point to point 11 : 2 cones, base to base 12 : rhombus (diamond) 13 : 2 cones (points upward) 14 : 2 cones (points downward) 15 : besom, point up (broom or perch) 16 : besom, point down (broom or perch)	(S) EN	1,1

		17 : flag 18 : sphere over rhombus 19 : square 20 : rectangle, horizontal 21 : rectangle, vertical 22 : trapezium, up 23 : trapezium, down 24 : triangle, point up 25 : triangle, point down 26 : circle 27 : two upright crosses (one over the other) 27 : two upright crosses (one over the other) 28 : T-shape 29 : triangle pointing up over a circle 30 : upright cross over a circle 31 : rhombus over a circle 32 : circle over a triangle pointing up 33 : other shape (see INFORM)		
Vertical length	(VERLEN)		RE	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><b>INT 1 Reference:</b> Q 50-62, 130.6</p> <p><b>19.6.1 Special purpose/general buoys (see S-4 – B-461.3 and B-467)</b></p> <p>Special marks are used to indicate to the mariner a special area or feature, the nature of which is usually apparent from the ENC, paper chart or associated publication. Special marks may also be used to mark a channel within a channel (e.g. a Deep Water route), using yellow buoys of the appropriate lateral shape, or yellow spherical buoys to mark the centreline. A special buoy may be any shape but must not conflict with lateral or safe water marks (e.g. an outfall buoy on the port-side of a channel could be can but should not be conical).</p> <p>To conform to the IALA Maritime Buoyage System (see clause X.X), the body of the buoy is yellow. The topmark (if fitted) is a yellow diagonal 'X' (St Andrew's cross). Lights (if fitted) are yellow and of any rhythm except those used for cardinal, isolated danger and safe water marks.</p> <p>If it is required to encode a buoy having the function of a special purpose mark, or a buoy whose appearance</p>				

**Comment [j140]:** S-57  
Extension 06/01.

or purpose is inadequately known, it must be done using the feature **Bouy Special Purpose/General**.

In the following table, a blank indicates that the encoder may choose a relevant value for the attribute. The table contains the most common examples of coding; other coding combinations are possible for **Bouy Special Purpose/General** objects.

Feature	INT1	Feature	buoy shape	category of special purpose mark	Other attributes
Firing danger area buoy	IQ50	<b>Bouy Special Purpose/General</b>		1	
Target	IQ51	<b>Bouy Special Purpose/General</b>		2	
Marker ship	IQ52	<b>Bouy Special Purpose/General</b>		3	
Barge	IQ53	<b>Bouy Special Purpose/General</b>		5	
Degaussing range buoy	IQ54	<b>Bouy Special Purpose/General</b>		4	
Buoy marking cable	IQ55	<b>Bouy Special Purpose/General</b>		6	
Spoil ground buoy	IQ56	<b>Bouy Special Purpose/General</b>		7	
Buoy marking outfall	IQ57	<b>Bouy Special Purpose/General</b>		8	
Buoy marking pipeline		<b>Bouy Special Purpose/General</b>		39	
Emergency wreck marking buoy		<b>Bouy Special Purpose/General</b>	4 or 5	27	<b>colour</b> = 5,6 <b>colour pattern</b> = 2
Superbuoy	IQ26	<b>Buoy ***</b>	7		
Large automatic navigational buoy	IP6	<b>Bouy Special Purpose/General</b>	7	15	
Data-collecting buoy of superbuoy size	IQ58	<b>Bouy Special Purpose/General</b>	7	9	
Buoy marking wave recorder (or current meter)	IQ59	<b>Bouy Special Purpose/General</b>		10	<b>information</b> = wave recorder (e.g.)
Seaplane anchorage buoy	IQ60	<b>Bouy Special Purpose/General</b>		11	
Buoy marking traffic separation scheme	IQ61	<b>Bouy Special Purpose/General</b>		19	
Buoy marking recreation zone	IQ62	<b>Bouy Special Purpose/General</b>		12	
Floating waste bin		<b>Bouy Special Purpose/General</b>		Empty (null) value	<b>information</b> = waste bin (e.g.)
Subsurface data acquisition buoy		<b>Obstruction</b>	/	/	<b>value of sounding</b> = depth of subsurface buoy <b>water level effect</b> = 3 <b>information</b> = ODAS

**Remarks:**

- The attribute **colour pattern** must be populated if more than one value is populated for the mandatory attribute **colour**.
- For the complex attribute **topmark**, the sub-attribute **colour pattern** must be populated if more than one value is populated for the mandatory sub-attribute **colour**.
- If it is required to encode the total vertical length, including the **topmark** and any equipment **features** (e.g. light), of the buoy above the water level, it must be done using the attribute **vertical length**.

lateral; buoy, safe water; mooring/warping facility.

## 19.7 Safe water buoys

<p><b>IHO Definition: BUOY, SAFE WATER.</b> A buoy is a floating object moored to the bottom in a particular place, as an aid to navigation or for other specific purposes. (IHO Dictionary – S-32).</p> <p>A safe water buoy is used to indicate that there is navigable water around the mark. (UKHO NP 735, 5<sup>th</sup> Edition).</p>				
<b>S-101 Geo Feature: Buoy safe water (BOYSAW)</b>				
<b>Primitives: Point</b>				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Buoy shape	(BOYSHP)	1 : conical (nun, ogival) 2 : can (cylindrical) 3 : spherical 4 : pillar 5 : spar (spindle) 6 : barrel (tun) 7 : superbouy 8 : ice buoy	EN	1,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1

Marks navigational – system of	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 10 : other system 11 : CEVNI	EN	0,1
Nature of construction	(NATCON)	6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 5 : periodic/intermittent 7 : temporary 8 : private 18 : existence doubtful	EN	0,*
Topmark	(TOPMAR)		C	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	(S) EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	(S) EN	0,1
Topmark/daymark shape	(TOPSHP)	1 : cone, point up 2 : cone, point down 3 : sphere 4 : 2 spheres 5 : cylinder (can) 6 : board 7 : x-shape (St. Andrew's cross) 8 : upright cross (St George's cross) 9 : cube, point up 10 : 2 cones, point to point 11 : 2 cones, base to base 12 : rhombus (diamond) 13 : 2 cones (points upward) 14 : 2 cones (points downward) 15 : besom, point up (broom or perch) 16 : besom, point down (broom or perch) 17 : flag 18 : sphere over rhombus 19 : square 20 : rectangle, horizontal 21 : rectangle, vertical 22 : trapezium, up	(S) EN	1,1

		23 : trapezium, down 24 : triangle, point up 25 : triangle, point down 26 : circle 27 : two upright crosses (one over the other) 27 : two upright crosses (one over the other) 28 : T-shape 29 : triangle pointing up over a circle 30 : upright cross over a circle 31 : rhombus over a circle 32 : circle over a triangle pointing up 33 : other shape (see INFORM)		
Vertical length	(VERLEN)		RE	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: Q 130.5

#### 19.7.1 Safe water buoys (see S-4 – B-461.3 and B-467)

Safe water marks are used to indicate there is safe water all around the mark. It may be used as a centre-line, mid-channel or landfall buoy, or to mark the best point of passage under a bridge.

To conform to the IALA Maritime Buoyage System (see clause X.X), the shape of a safe water buoy is spherical, pillar or spar. The body of the mark has red and white vertical stripes. A red spherical topmark is an important feature if the buoy is not spherical and carried wherever practicable. The light (if fitted) is white Oc, Iso, LFI or Mo(A) with a period of 10s.

If it is required to encode a buoy having the function of a safe water mark, it must be done using the feature **Buoy Safe Water**.

**SAFE WATER MARKS**

Topmark (if any):  
Single sphere.

Shape: Spherical  
or  
pillar or spar.

Light, when fitted,  
is **white**  
Isophase or Occulting,  
or one Long Flash  
every 10 seconds or  
Morse "A"

Iso  
 Occ  
 L Fl 10s  
 Morse "A"

**Remarks:**

- The attribute **colour pattern** must be populated if more than one value is populated for the mandatory attribute **colour**.
- For the complex attribute **topmark**, the sub-attribute **colour pattern** must be populated if more than one value is populated for the mandatory sub-attribute **colour**.
- If it is required to encode the total vertical length, including the topmark and any equipment **features** (e.g. light), of the buoy above the water level, it must be done using the attribute **vertical length**.

**Distinction:** Buoy, cardinal; buoy, emergency wreck marking; buoy, installation; buoy, isolated danger; buoy, lateral; buoy, special purpose/general; mooring/warping facility.



## 19.8 Cardinal buoys

IHO Definition: **BUOY, CARDINAL**. A buoy is a floating object moored to the bottom in a particular place, as an aid to navigation or for other specific purposes. (IHO Dictionary – S-32).

A cardinal buoy is used in conjunction with the compass to indicate where the mariner may find the best navigable water. It is placed in one of the four quadrants (North, East, South and West), bounded by inter-cardinal bearings from the point marked. (UKHO NP 735, 5<sup>th</sup> Edition).

### **S-101 Geo Feature: Buoy cardinal (BOYCAR)**

**Primitives:** Point, Surface

Real World		Paper Chart Symbol	ECDIS Symbol	
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Buoy shape	(BOYSHP)	1 : conical (nun, ogival) 2 : can (cylindrical) 3 : spherical 4 : pillar 5 : spar (spindle) 6 : barrel (tun) 7 : <span>superbuoy</span> 8 : ice buoy	EN	1,1
Category of cardinal mark	(CATCAM)	1 : north cardinal mark 2 : east cardinal mark 3 : south cardinal mark 4 : west cardinal mark	EN	1,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
<span>Date range</span>			C	0,2
<span>Date end</span>		ISO 8601:1988	(S) DA	0,1
<span>Date start</span>		ISO 8601:1988	(S) DA	0,1
<span>Periodic</span>			(S) BO	0,1
<span>Feature name</span>			C	0,*
<span>Category of name</span>		1 : <span>official name</span> 2 : <span>alternate name</span> 3 : <span>common name</span> 4 : <span>short name</span>	(S) EN	0,1

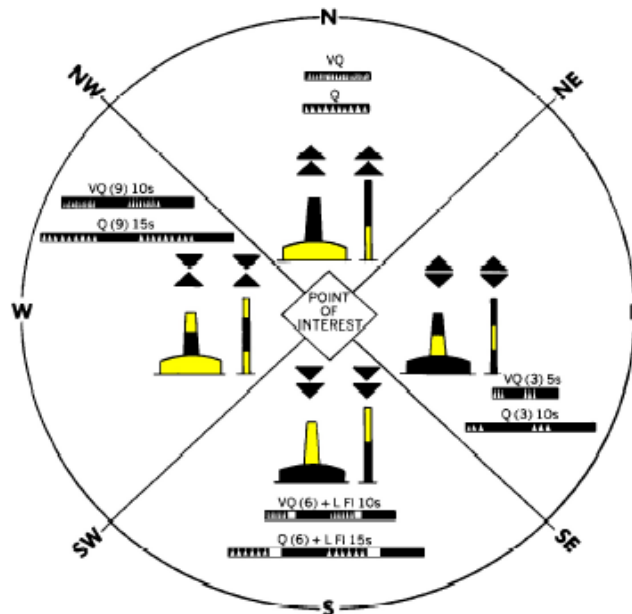
		5 : display name		
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Marks navigational – system of	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 10 : other system 11 : CEVNI	EN	0,1
Nature of construction	(NATCON)	6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 5 : periodic/intermittent 7 : temporary 8 : private 18 : existence doubtful	EN	0,*
Topmark	(TOPMAR)		C	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	(S) EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	(S) EN	0,1
Topmark/daymark shape	(TOPSHP)	1 : cone, point up 2 : cone, point down 3 : sphere 4 : 2 spheres 5 : cylinder (can) 6 : board 7 : x-shape (St. Andrew's cross) 8 : upright cross (St George's cross) 9 : cube, point up 10 : 2 cones, point to point 11 : 2 cones, base to base 12 : rhombus (diamond) 13 : 2 cones (points upward) 14 : 2 cones (points downward) 15 : besom, point up (broom or perch) 16 : besom, point down (broom or perch) 17 : flag	(S) EN	1,1

		18 : sphere over rhombus 19 : square 20 : rectangle, horizontal 21 : rectangle, vertical 22 : trapezium, up 23 : trapezium, down 24 : triangle, point up 25 : triangle, point down 26 : circle 27 : two upright crosses (one over the other) 27 : two upright crosses (one over the other) 28 : T-shape 29 : triangle pointing up over a circle 30 : upright cross over a circle 31 : rhombus over a circle 32 : circle over a triangle pointing up 33 : other shape (see INFORM)		
Vertical length	(VERLEN)		RE	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><b>INT 1 Reference:</b> Q 130.3</p> <p><b>19.8.1 Cardinal buoys (see S-4 – B-461.3 and B-467)</b></p> <p>Cardinal marks are used in conjunction with the compass to indicate where a mariner may find best navigable water, taking their name from the quadrant in which they are placed in relation to the point marked. The mariner should pass N of a North mark, E of an East mark, etc. The shape of cardinal buoys is not significant (although they are usually pillar or spar).</p> <p>To conform to the IALA Maritime Buoyage System (see clause X.X), the body has black and yellow bands, configured with black reflecting the points of the topmark cones (e.g. black above yellow for north). Black double-cone topmarks are an important feature of cardinal marks and are carried wherever practicable. The points are up for a north mark, down for a south mark, apart for an east mark and together for a west mark. Lights (if fitted) are white Q or VQ, uninterrupted for the north, 3 flashes for east, 6 flashes + LFI for south and 9 flashes for west (resembling an analogue clock).</p> <p>If it is required to encode a buoy having the function of a cardinal mark, it must be done using the feature</p>				

**Buoy Cardinal.**

## IALA MARITIME BUOYAGE SYSTEM CARDINAL MARKS REGIONS A AND B

Topmarks are always fitted (when practicable),  
Buoy shapes are pillar or spar.



Lights, when fitted, are **white**. Very Quick Flashing  
or Quick Flashing; a South mark also has a  
Long Flash immediately following the quick flashes.

**Remarks:**

- The attribute **colour pattern** must be populated if more than one value is populated for the mandatory attribute **colour**.
- For the complex attribute **topmark**, the sub-attribute **colour pattern** must be populated if more than one value is populated for the mandatory sub-attribute **colour**.
- If it is required to encode the total vertical length, including the topmark and any equipment **features** (e.g. light), of the buoy above the water level, it must be done using the attribute **vertical length**.

**Distinction:** Buoy, emergency wreck marking; buoy, installation; buoy, isolated danger; buoy, lateral; buoy, safe water; buoy, special purpose/general; mooring/warping facility.

## 19.9 Topmarks

IHO Definition: <b>TOPMARK</b> .—A characteristic shape secured at the top of a buoy or beacon to aid in its identification. (IHO Dictionary—S-32).					
<b>S-101 Geo Feature: Topmark (TOPMAR)</b>					
<b>Primitives: Point</b>					
<i>Real-World</i>		<i>Paper-Chart-Symbol</i>		<i>ECDIS-Symbol</i>	
<b>S-101-Attribute</b>	<b>S-57 Acronym</b>	<b>Allowable-Encoding Value</b>	<b>Type</b>	<b>Multiplicity</b>	
Colour	(COLOUR)	1÷white 2÷black 3÷red 4÷green 5÷blue 6÷yellow 7÷grey 8÷brown 9÷amber 10÷violet 11÷orange 12÷magenta 13÷pink	EN	0,*	
Colour-pattern	(COLPAT)	1÷horizontal-stripes 2÷vertical-stripes 3÷diagonal-stripes 4÷squared 5÷stripes-(direction unknown) 6÷border-stripe	EN	0,1	
Date-range			G	0,2	
—Date-end		ISO-8601:1988	(S)-DA	0,1	
—Date-start		ISO-8601:1988	(S)-DA	0,1	
—Periodic			(S)-BO	0,1	
Status	(STATUS)	1÷permanent 5÷periodic/intermittent 7÷temporary 8÷private 12÷illuminated 14÷public	EN	0,*	
Topmark-shape	(TOPSHP)	1÷cone,-point-up 2÷cone,-point-down 3÷sphere 4÷2-spheres 5÷cylinder-(can) 6÷board 7÷x-shape-(St.-Andrew's cross) 8÷upright-cross-(St George's-cross) 9÷cube,-point-up 10÷2-cones,-point-to-point 11÷2-cones,-base-to-base 12÷rhombus-(diamond) 13÷2-cones-(points-upward) 14÷2-cones-(points	EN	1,1	

		downward) 15 : besom, point up (broom or perch) 16 : besom, point down (broom or perch) 17 : flag 18 : sphere over rhombus 19 : square 20 : rectangle, horizontal 21 : rectangle, vertical 22 : trapezium, up 23 : trapezium, down 24 : triangle, point up 25 : triangle, point down 26 : circle 27 : two upright crosses (one over the other) 27 : two upright crosses (one over the other) 28 : T-shape 29 : triangle pointing up over a circle 30 : upright cross over a circle 31 : rhombus over a circle 32 : circle over a triangle pointing up 33 : other shape (see INFORM)		
Information			C	0,*
— Language		ISO 639-3	(S) TE	0,1
— Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description —			C	0,*
— File reference	(TXTDSC)		(S) TE	1,1
— Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(REGDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
— Authority			(S) TE	1,1
— Nationality			(S) TE	1,1
— ID code			(S) TE	0,1
— Source			(S) TE	0,1
— Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><u>INT 1 Reference: Q 9</u></p> <p><b>19.9.1 Topmarks (see S-4 – B-463 and B-467)</b></p> <p>Many different topmarks are used on buoys and on beacons but in the IALA Maritime Buoyage System the variations are reduced to a few important shapes: can, conical, spherical, X-shaped and upright (cruciform).</p> <p>Leading topmarks are often added to leading beacons, which are usually constructed in pairs and provide a lead to be followed. There is currently no guidance on the standard shapes or colours of topmarks for leading marks. However, leading topmarks are commonly triangular shaped structures pointing upwards (front) and downwards (rear), but other shapes may be used.</p> <p>If it is required to encode a topmark, it must be done using the feature <b>Topmark</b>.</p>				

Remarks:

- ~~For usage of topmarks in the IALA Maritime Buoyage System, see features related to fixed and floating aids to navigation in Section X.~~

Distinction: ~~Beacon, cardinal; beacon, isolated danger; beacon, lateral; beacon, safe water; beacon, special purpose/general; buoy, cardinal; buoy, emergency wreck marking; buoy, installation; buoy, isolated danger; buoy, lateral; buoy, safe water; buoy, special purpose/general; daymark.~~

## 19.10 Retroreflectors

IHO Definition: **RETROREFLECTOR**. A means of distinguishing unlighted marks at night. **Retroreflective** material is secured to the mark in a particular pattern to reflect back light. (UKHO NP 735, 5<sup>th</sup> Edition).

### **S-101 Geo Feature: Retroreflector (RETRFL)**

#### **Primitives: Point**

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Height	(HEIGHT)		RE	0,1
Status	(STATUS)	1 : permanent 4 : not in use 8 : private	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1



Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><u>INT 1 Reference:</u> Q 6</p> <p><b>19.10.1 Retroreflectors (see S-4 – B-460.7)</b></p> <p>Retroreflective material may be secured to unlit marks to aid their identification at night. The material is coloured according to one of two recognized IALA codes ("Standard" and "Comprehensive"). In any specified area only one of the codes will be used and this may be given in nautical publications.</p> <p>If it is required to encode a retroreflector, it must be done using the feature <b>Retroreflector</b>.</p> <p><u>Remarks:</u></p> <ul style="list-style-type: none"> <li>The complex attribute <b>information</b> is used to describe letters, patterns or numerals shown on the retroreflector.</li> <li>The body carrying the retroreflector is a separate feature.</li> </ul> <p><u>Distinction:</u> Beacon, cardinal; beacon, isolated danger; beacon, lateral; beacon, safe water; beacon, special purpose/general; buoy, cardinal; buoy, emergency wreck marking; buoy, installation; buoy, isolated danger; buoy, lateral; buoy, safe water; buoy, special purpose/general; radar reflector.</p>				

### 19.11 Cardinal beacons

**IHO Definition: BEACON, CARDINAL.** A beacon is a prominent specially constructed object forming a conspicuous mark as a fixed aid to navigation or for use in hydrographic survey. (IHO Dictionary – S-32).

A cardinal beacon is used in conjunction with the compass to indicate where the mariner may find the best navigable water. It is placed in one of the four quadrants (North, East, South and West), bounded by inter-cardinal bearings from the point marked. (UKHO NP 735, 5<sup>th</sup> Edition).

**S-101 Geo Feature: Beacon cardinal (BCNCAR)**

**Primitives: Point**

Real World	Paper Chart Symbol	ECDIS Symbol		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Beacon shape	(BCNSHP)	1 : stake, pole, perch, post 2 : withy 3 : beacon tower 4 : lattice beacon 5 : pile beacon 6 : cairn 7 : buoyant beacon	EN	1,1
Category of cardinal mark	(CATCAM)	1 : north cardinal mark 2 : east cardinal mark 3 : south cardinal mark 4 : west cardinal mark	EN	1,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Elevation	(ELEVAT)		RE	0,1
Feature name			C	0,*

Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
Marks navigational – system of	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 10 : other system 11 : CEVNI	EN	0,1
Nature of construction	(NATCON)	1 : masonry 2 : concreted 6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 12 : illuminated 18 : existence doubtful	EN	0,*
Topmark	(TOPMAR)		C	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	(S) EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	(S) EN	0,1
Topmark/daymark shape	(TOPSHP)	1 : cone, point up 2 : cone, point down 3 : sphere 4 : 2 spheres 5 : cylinder (can) 6 : board 7 : x-shape (St. Andrew's cross) 8 : upright cross (St George's cross) 9 : cube, point up 10 : 2 cones, point to point	(S) EN	1,1

		11 : 2 cones, base to base 12 : rhombus (diamond) 13 : 2 cones (points upward) 14 : 2 cones (points downward) 15 : besom, point up (broom or perch) 16 : besom, point down (broom or perch) 17 : flag 18 : sphere over rhombus 19 : square 20 : rectangle, horizontal 21 : rectangle, vertical 22 : trapezium, up 23 : trapezium, down 24 : triangle, point up 25 : triangle, point down 26 : circle 27 : two upright crosses (one over the other) 27 : two upright crosses (one over the other) 28 : T-shape 29 : triangle pointing up over a circle 30 : upright cross over a circle 31 : rhombus over a circle 32 : circle over a triangle pointing up 33 : other shape (see INFORM)		
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<b>INT 1 Reference:</b> Q 130.3 <b>19.11.1 Cardinal beacons (see S-4 – B-461.3 and B-467)</b> Cardinal marks are used in conjunction with the compass to indicate where a mariner may find best navigable water, taking their name from the quadrant in which they are placed in relation to the point marked. The				

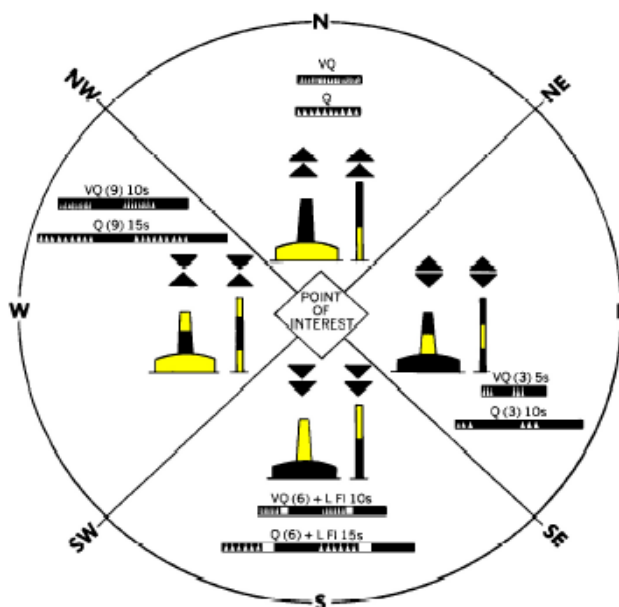
mariner should pass N of a North mark, E of an East mark, etc.

To conform to the IALA Maritime Buoyage System (see clause X.X), the body of the beacon has black and yellow bands, configured with black reflecting the points of the topmark cones (e.g. black above yellow for north). Black double-cone topmarks are an important feature of cardinal marks and are carried wherever practicable. The points are up for a north mark, down for a south mark, apart for an east mark and together for a west mark. Lights (if fitted) are white Q or VQ, uninterrupted for the north, 3 flashes for east, 6 flashes + LFI for south and 9 flashes for west (resembling an analogue clock).

If it is required to encode a beacon having the function of a cardinal mark, it must be done using the feature **Beacon Cardinal**.

### IALA MARITIME BUOYAGE SYSTEM CARDINAL MARKS REGIONS A AND B

Topmarks are always fitted (when practicable),  
Buoy shapes are pillar or spar.



Lights, when fitted, are **white**. Very Quick Flashing or Quick Flashing; a South mark also has a Long Flash immediately following the quick flashes.

#### Remarks:

- The attribute **colour pattern** must be populated if more than one value is populated for the mandatory attribute **colour**.
- For the complex attribute **topmark**, the sub-attribute **colour pattern** must be populated if more than one value is populated for the mandatory sub-attribute **colour**.
- If it is required to encode the altitude of the ground level above the vertical datum at the position of a beacon, it must be done using the attribute **elevation**, but only for beacons built on land.
- If it is required to encode the total altitude of a beacon, including the **topmark** and any equipment **features** (e.g. light), above the vertical datum, it must be done using the attribute **height**.
- If it is required to encode the total vertical length of a beacon, including the **topmark** and any equipment

**features** (e.g. light), above the seabed or ground, it must be done using the attribute **vertical length**.

- If it is required to encode a cairn that bears the colour(s) specified by a navigational system of marks, it must be done using a beacon **feature**.

Distinction: Beacon, isolated danger; beacon, lateral; beacon, safe water; beacon, special purpose/general; daymark.

## 19.12 Safe water beacons

**IHO Definition: BEACON, SAFE WATER.** A safe water beacon is a prominent specially constructed object forming a conspicuous mark as a fixed aid to navigation or for use in hydrographic survey. (IHO Dictionary – S-32, Edition 5).

A safe water beacon is used to indicate that there is navigable water around the mark. (UKHO NP735, 5<sup>th</sup> Edition).

**S-101 Geo Feature: Beacon safe water (BCNSAF)**

**Primitives: Point**

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Beacon shape	(BCNSHP)	1 : stake, pole, perch, post 2 : withy 3 : beacon tower 4 : lattice beacon 5 : pile beacon 6 : cairn 7 : buoyant beacon	EN	1,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Condition	(COND TN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Elevation	(ELEVAT)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name	(S) EN	0,1

		5 : display name		
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
Marks navigational – system of	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 10 : other system 11 : CEVNI	EN	0,1
Nature of construction	(NATCON)	1 : masonry 2 : concreted 6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 12 : illuminated 18 : existence doubtful	EN	0,*
Topmark	(TOPMAR)		C	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	(S) EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	(S) EN	0,1
Topmark/daymark shape	(TOPSHP)	1 : cone, point up 2 : cone, point down 3 : sphere 4 : 2 spheres 5 : cylinder (can) 6 : board 7 : x-shape (St. Andrew's cross) 8 : upright cross (St George's cross) 9 : cube, point up 10 : 2 cones, point to point 11 : 2 cones, base to base 12 : rhombus (diamond) 13 : 2 cones (points upward) 14 : 2 cones (points downward)	(S) EN	1,1



		15 : besom, point up (broom or perch) 16 : besom, point down (broom or perch) 17 : flag 18 : sphere over rhombus 19 : square 20 : rectangle, horizontal 21 : rectangle, vertical 22 : trapezium, up 23 : trapezium, down 24 : triangle, point up 25 : triangle, point down 26 : circle 27 : two upright crosses (one over the other) 27 : two upright crosses (one over the other) 28 : T-shape 29 : triangle pointing up over a circle 30 : upright cross over a circle 31 : rhombus over a circle 32 : circle over a triangle pointing up 33 : other shape (see INFORM)		
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><b>INT 1 Reference:</b> Q 130.5</p> <p><b>19.12.1 Safe water beacons (see S-4 – B-461.3 and B-467)</b></p> <p>Safe water marks are used to indicate there is safe water all around the mark. It may be used as a centre-line, mid-channel or landfall beacon, or to mark the best point of passage under a bridge.</p> <p>To conform to the IALA Maritime Buoyage System (see clause X.X), the body of the mark has red and white vertical stripes. A red spherical topmark is an important feature if the beacon is not spherical and carried wherever practicable. The light (if fitted) is white Oc, Iso, LFI or Mo(A) with a period of 10s.</p> <p>If it is required to encode a beacon having the function of a safe water mark, it must be done using the feature</p>				

**Beacon Safe Water.**Remarks:

- The attribute **colour pattern** must be populated if more than one value is populated for the mandatory attribute **colour**.
- For the complex attribute **topmark**, the sub-attribute **colour pattern** must be populated if more than one value is populated for the mandatory sub-attribute **colour**.
- If it is required to encode the altitude of the ground level above the vertical datum at the position of a beacon, it must be done using the attribute **elevation**, but only for beacons built on land.
- If it is required to encode the total altitude of a beacon, including the **topmark** and any equipment **features** (e.g. light), above the vertical datum, it must be done using the attribute **height**.
- If it is required to encode the total vertical length of a beacon, including the **topmark** and any equipment **features** (e.g. light), above the seabed or ground, it must be done using the attribute **vertical length**.
- If it is required to encode a cairn that bears the colour(s) specified by a navigational system of marks, it must be done using a beacon **feature**.

Distinction: Beacon, cardinal; beacon, isolated danger; beacon, lateral; beacon, special purpose/general; daymark.

### 19.13 Isolated danger beacons

**IHO Definition: BEACON, ISOLATED DANGER.** A beacon is a prominent, specially constructed object forming a conspicuous mark as a fixed aid to navigation or for use in hydrographic survey. (IHO Dictionary – S-32).

An isolated danger beacon is a beacon erected on an isolated danger of limited extent, which has navigable water all around it. (UKHO NP735, 5th Edition).

#### **S-101 Geo Feature: Beacon isolated danger (BCNISD)**

##### **Primitives: Point**

Real World	Paper Chart Symbol	ECDIS Symbol		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Beacon shape	(BCNSHP)	1 : stake, pole, perch, post 2 : withy 3 : beacon tower 4 : lattice beacon 5 : pile beacon 6 : cairn 7 : buoyant beacon	EN	1,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Condition	(COND TN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Elevation	(ELEVAT)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name	(S) EN	0,1

		5 : display name		
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
Marks navigational – system of	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 10 : other system 11 : CEVNI	EN	0,1
Nature of construction	(NATCON)	1 : masonry 2 : concreted 6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 12 : illuminated 18 : existence doubtful	EN	0,*
Topmark	(TOPMAR)		C	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	(S) EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	(S) EN	0,1
Topmark/daymark shape	(TOPSHP)	1 : cone, point up 2 : cone, point down 3 : sphere 4 : 2 spheres 5 : cylinder (can) 6 : board 7 : x-shape (St. Andrew's cross) 8 : upright cross (St George's cross) 9 : cube, point up 10 : 2 cones, point to point 11 : 2 cones, base to base 12 : rhombus (diamond) 13 : 2 cones (points upward) 14 : 2 cones (points downward)	(S) EN	1,1

		15 : besom, point up (broom or perch) 16 : besom, point down (broom or perch) 17 : flag 18 : sphere over rhombus 19 : square 20 : rectangle, horizontal 21 : rectangle, vertical 22 : trapezium, up 23 : trapezium, down 24 : triangle, point up 25 : triangle, point down 26 : circle 27 : two upright crosses (one over the other) 27 : two upright crosses (one over the other) 28 : T-shape 29 : triangle pointing up over a circle 30 : upright cross over a circle 31 : rhombus over a circle 32 : circle over a triangle pointing up 33 : other shape (see INFORM)		
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><b>INT 1 Reference:</b> IQ 130.4</p> <p><b>19.13.1 Isolated danger beacons (see S-4 – B-461.3 and B-467)</b></p> <p>Isolated danger beacons are placed on isolated dangers of limited extent with navigable water all around them.</p> <p>To conform to the IALA Maritime Buoyage System (see clause X.X), the body of an isolated danger beacon is black, with one or more red bands. Black double-sphere topmarks are an important feature of isolated danger beacons and carried wherever practicable. The light (if fitted) is white Fl(2).</p> <p>If it is required to encode a beacon having the function of an isolated danger mark, it must be done using the</p>				

**feature** Beacon Isolated Danger.

## IALA MARITIME BUOYAGE SYSTEM REGIONS A AND B ISOLATED DANGER MARKS

Topmarks are  
always fitted  
(when practicable).

Shape: Optional, but not  
conflicting with lateral  
marks; pillar or spar  
preferred.



Light, when fitted, is  
**white**  
Group Flashing(2)

 Fl (2)

### Remarks:

- The attribute **colour pattern** must be populated if more than one value is populated for the mandatory attribute **colour**.
- For the complex attribute **topmark**, the sub-attribute **colour pattern** must be populated if more than one value is populated for the mandatory sub-attribute **colour**.
- If it is required to encode the altitude of the ground level above the vertical datum at the position of a beacon, it must be done using the attribute **elevation**, but only for beacons built on land.
- If it is required to encode the total altitude of a beacon, including the **topmark** and any equipment **features** (e.g. light), above the vertical datum, it must be done using the attribute **height**.
- If it is required to encode the total vertical length of a beacon, including the **topmark** and any equipment **features** (e.g. light), above the seabed or ground, it must be done using the attribute **vertical length**.
- If it is required to encode a cairn that bears the colour(s) specified by a navigational system of marks, it must be done using a beacon **feature**.

Distinction: Beacon, cardinal; beacon, lateral; beacon, safe water; beacon, special purpose/general; daymark.

## 19.14 Installation buoys

<p>IHO Definition: <b>BUOY, INSTALLATION.</b> A buoy is a floating object moored to the bottom in a particular place, as an aid to navigation or for other specific purposes. (IHO Dictionary – S-32).</p> <p>An installation buoy is a buoy used for loading tankers with gas or oil. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.20, November 2000).</p>				
<b>S-101 Geo Feature:</b> Buoy installation (BOYINB)				
<b>Primitives:</b> Point				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Buoy shape	(BOYSHP)	1 : conical (nun, ogival) 2 : can (cylindrical) 3 : spherical 4 : pillar 5 : spar (spindle) 6 : barrel (tun) 7 : superbouy 8 : ice buoy	EN	1,1
Category of installation buoy	(CATINB)	1 : catenary anchor leg mooring (CALM) 2 : single buoy mooring (SBM or SPM)	EN	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1

Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Marks-navigational—system of	(MARSYS)	1::IALA-A 2::IALA-B 9::no-system 10::other-system 11::CEVNI	EN	0,1
Nature of construction	(NATCON)	6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted	EN	0,*
Product	(PRODCT)	1 : oil 2 : gas 18 : liquefied natural gas (LNG) 19 : liquefied petroleum gas (LPG)	EN	0,1
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 18 : existence doubtful	EN	0,*
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><b>INT 1 Reference:</b> L 16</p> <p><b>19.14.1 Installation buoys (see S-4 – B-445.4)</b></p> <p>Although the oil and gas from some fields are sent ashore by submarine pipeline, a variety of mooring systems have been developed for use in deep water and in the vicinity of certain ports, to allow the loading of large vessels and the permanent mooring of floating storage vessels or units. These offshore systems include large mooring buoys, designed for mooring vessels up to 500,000 tonnes, and platforms on structures fixed at their lower ends to the sea floor. They allow a vessel to moor forward or aft to them, and to swing to the wind or stream, and are termed installation buoys.</p>				



If it is required to encode an installation buoy, it must be done using the feature **Buoy Installation**.

Remarks:

- The attribute **colour pattern** must be populated if more than one value is populated for the mandatory attribute **colour**.
- If it is required to encode the total vertical length, including any equipment **features** (e.g. light), of the buoy above the water level, it must be done using the attribute **vertical length**.

Distinction: Buoy, special purpose/general; mooring/warping facility; offshore platform.

### 19.15 Light floats

**IHO Definition:** **LIGHT FLOAT.** A boat-like structure used instead of a light buoy in waters where strong streams or currents are experienced, or when a greater elevation than that of a light buoy is necessary. (IHO Dictionary – S-32).

#### **S-101 Geo Feature:** Light float (LITFLT)

#### **Primitives:** Point

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Horizontal length	(HORLEN)		RE	0,1
Horizontal width	(HORWID)		RE	0,1
Nature of construction	(NATCON)	6 : wooden 7 : metal 9 : painted	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use	EN	0,*

		5 : periodic/intermittent 7 : temporary 8 : private 14 : public 16 : watched 17 : un-watched		
Topmark	(TOPMAR)		C	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	(S) EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	(S) EN	0,1
Topmark/daymark shape	(TOPSHP)	1 : cone, point up 2 : cone, point down 3 : sphere 4 : 2 spheres 5 : cylinder (can) 6 : board 7 : x-shape (St. Andrew's cross) 8 : upright cross (St George's cross) 9 : cube, point up 10 : 2 cones, point to point 11 : 2 cones, base to base 12 : rhombus (diamond) 13 : 2 cones (points upward) 14 : 2 cones (points downward) 15 : besom, point up (broom or perch) 16 : besom, point down (broom or perch) 17 : flag 18 : sphere over rhombus 19 : square 20 : rectangle, horizontal 21 : rectangle, vertical 22 : trapezium, up 23 : trapezium, down 24 : triangle, point up 25 : triangle, point down 26 : circle 27 : two upright crosses (one over the other) 27 : two upright crosses (one over the other) 28 : T-shape 29 : triangle pointing up over a circle 30 : upright cross over a circle	(S) EN	1,1

		31 : rhombus over a circle 32 : circle over a triangle pointing up 33 : other shape (see INFORM)		
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><u>INT 1 Reference:</u> Q 30-34</p> <p><b>19.15.1 Lights floats (see S-4 – B-462.8)</b></p> <p>If it is required to encode a light float, it must be done using the <b>feature Light Float</b>.</p> <p><u>Remarks:</u></p> <ul style="list-style-type: none"> <li>The light on a light float is a separate feature, handled as with buoys, beacons, etc.</li> </ul> <p><u>Distinction:</u> Buoy, cardinal; buoy, emergency wreck marking; buoy, installation; buoy, isolated danger; buoy, lateral; buoy, safe water; buoy, special purpose/general; light vessel.</p>				

## 19.16 Emergency wreck marking buoys

IHO Definition: **BUOY, EMERGENCY WRECK MARKING**. A buoy is a floating object moored to the bottom in a particular place, as an aid to navigation or for other specific purposes. (IHO Dictionary – S-32).

An emergency wreck marking buoy is a buoy moored on or above a new wreck, designed to provide a prominent (both visual and radio) and easily identifiable temporary (24-72 hours) first response. (UKHO NP 735, 6<sup>th</sup> Edition).

### **S-101 Geo Feature:** Buoy emergency wreck marking

#### **Primitives:** Point

<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Buoy shape	(BOYSHP)	1 : conical (nun, ogival) 2 : can (cylindrical) 3 : spherical 4 : pillar 5 : spar (spindle) 6 : barrel (tun) 7 : superbouy 8 : ice buoy	EN	1,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1

Marks navigational – system of	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 10 : other system 11 : CEVNI	EN	0,1
Nature of construction	(NATCON)	6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 5 : periodic/intermittent 7 : temporary 8 : private 18 : existence doubtful	EN	0,*
Topmark	(TOPMAR)		C	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	(S) EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	(S) EN	0,1
Topmark/daymark shape	(TOPSHP)	1 : cone, point up 2 : cone, point down 3 : sphere 4 : 2 spheres 5 : cylinder (can) 6 : board 7 : x-shape (St. Andrew's cross) 8 : upright cross (St George's cross) 9 : cube, point up 10 : 2 cones, point to point 11 : 2 cones, base to base 12 : rhombus (diamond) 13 : 2 cones (points upward) 14 : 2 cones (points downward) 15 : besom, point up (broom or perch) 16 : besom, point down (broom or perch) 17 : flag 18 : sphere over rhombus 19 : square 20 : rectangle, horizontal 21 : rectangle, vertical 22 : trapezium, up	(S) EN	1,1

		23 : trapezium, down 24 : triangle, point up 25 : triangle, point down 26 : circle 27 : two upright crosses (one over the other) 27 : two upright crosses (one over the other) 28 : T-shape 29 : triangle pointing up over a circle 30 : upright cross over a circle 31 : rhombus over a circle 32 : circle over a triangle pointing up 33 : other shape (see INFORM)		
Vertical length	(VERLEN)		RE	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><u>INT 1 Reference:</u> ?????</p> <p><b>19.16.1 Emergency wreck marking buoys (see S-4 – B-461.3 and B-467)</b></p> <p>Emergency wreck marking buoys are used to mark new dangers until a permanent form of marking has been established and the danger itself has been promulgated by Notice to Mariners, or removed.</p> <p>To conform to the IALA Maritime Buoyage System (see clause X.X), the shape of an emergency wreck marking buoy is pillar or spar. The body of the mark has blue and yellow vertical stripes. The topmark (if fitted) is a standing/upright yellow '+' (St. George's cross). Lights (if fitted) are Al.Oc.BuY.3s.</p> <p>If it is required to encode a buoy having the function of an emergency wreck mark, it must be done using the feature <b>Buoy emergency wreck marking</b></p> <p style="text-align: center;">[INSERT DIAGRAM]</p> <p><u>Remarks:</u></p> <ul style="list-style-type: none"> <li>The attribute <b>colour pattern</b> must be populated if more than one value is populated for the mandatory attribute <b>colour</b>.</li> <li>For the complex attribute <b>topmark</b>, the sub-attribute <b>colour pattern</b> must be populated if more than one value is populated for the mandatory sub-attribute <b>colour</b>. The <b>topmark</b> complex attribute should be populated with sub-attributes <b>topmark shape</b> = 8 (upright cross (St George's cross)) and <b>colour</b> = 6 (yellow). An IALA compliant emergency wreck marking buoy topmar should be populated with sub-attributes <b>topmark shape</b> = 8 (upright cross (St George's cross)) and <b>colour</b> = 6 (yellow).</li> </ul>				

- If it is required to encode the total vertical length, including the topmark and any equipment features (e.g. light), of the buoy above the water level, it must be done using the attribute **vertical length**.
- An IALA compliant emergency wreck marking buoy should also have the following associated equipment features:
  - A **Light** feature (see clause X.X), with attributes **colour** = 5,6 (blue, yellow), **light characteristic** = 17 (occulting alternating), **signal group** = (1) and **signal period** = 3. The attribute **signal sequence** should be populated as  $1.00+(0.50)+1.00+(0.50)$  and the attribute **value of nominal range** should be populated as 4.
  - A **Radar Transponder Beacon** feature (see clause X.X), with attributes **category of radar transponder beacon** = 2 (racon, radar transponder beacon) and **signal group** = (D).

Distinction: Buoy, cardinal; buoy, installation; buoy, lateral; buoy, safe water; buoy, special purpose/general; mooring/warping facility.



## 19.17 Light vessels

<b>IHO Definition:</b> <b>LIGHT VESSEL.</b> A distinctively marked vessel anchored or moored at a charted point, to serve as an aid to navigation. By night, it displays a characteristic light(s) and is usually equipped with other devices, such as fog signal, submarine sound signal, and radio-beacon, to assist navigation. Also called light ship. (IHO Dictionary – S-32).				
<b>S-101 Geo Feature:</b> Light vessel (LITVES)				
<b>Primitives:</b> Point				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Horizontal length	(HORLEN)		RE	0,1
Horizontal width	(HORWID)		RE	0,1
Nature of construction	(NATCON)	6 : wooden 7 : metal 9 : painted	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent	EN	0,*

		2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 14 : public 16 : watched 17 : un-watched		
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: P 6

#### 19.17.1 Lights vessels (see S-4 – B-474.1-3)

Major floating lights are generally classed as those with a nominal range in excess of 10 nautical miles. Special circumstances, e.g. an isolated location, may mean that a floating light of lower range is given this status. The structure on which the light is fixed will be a light vessel, a major light float or a LANBY (Large Automatic Navigational Buoy, which is a type of superbuoy).

If it is required to encode a light vessel, it must be done using the **feature Light Vessel**.

#### Remarks:

- The attribute **colour pattern** must be populated if more than one value is populated for the mandatory attribute **colour**.

**Distinction:** Beacon, cardinal; beacon, isolated danger; beacon, lateral; beacon, safe water; beacon special purpose/general; buoy, cardinal; **buoy, emergency wreck marking**; buoy, installation; buoy, isolated danger; buoy, lateral; buoy, safe water; buoy, special purpose/general; light float.

## 19.18 Radar reflectors

IHO Definition: **RADAR REFLECTOR**. A device capable of, or intended for, reflecting radar signals. (IHO Dictionary – S-32).

A radar reflector is usually a “tetrahedron or pentagonal corner reflector (...) to facilitate reflection towards the sender”. (International Maritime Dictionary, 2<sup>nd</sup> Ed.).

### **S-101 Geo Feature:** Radar reflector (RADRFL)

#### **Primitives:** Point

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Height	(HEIGHT)		RE	0,1
Status	(STATUS)	1 : permanent 4 : not in use 8 : private	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

**INT 1 Reference:** S 4

#### **19.18.1 Radar reflectors (see S-4 – B-455.8 and B-465)**

If it is required to encode radar reflectors on **curve features** (e.g. overhead cables), this must be done using the **feature Radar Reflector**.

#### **Remarks:**

- If it is required to encode a **feature** which has no radar reflector, but is radar conspicuous, it must be indicated using attribute **radar conspicuous** on the **feature**.
- If it is required to encode an area or point **feature** which is radar conspicuous because it is fitted with a radar

reflector, it must be indicated using **radar conspicuous** on the **feature**. **A Radar Reflector feature must not be encoded in this case.**

Distinction: Retro-reflector.

## 19.19 Fog signals

<b>IHO Definition:</b> <b>FOG SIGNALS.</b> A warning signal transmitted by a vessel, or aid to navigation, during periods of low visibility. Also, the device producing such a signal. (IHO Dictionary – S-32).				
<b>S-101 Geo Feature:</b> Fog signal (FOGSIG)				
<b>Primitives:</b> Point				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of fog signal	(CATFOG)	1 : explosive 2 : diaphone 3 : siren 4 : nautophone 5 : reed 6 : tyfon 7 : bell 8 : whistle 9 : gong 10 : horn	EN	1,1
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Signal frequency	(SIGFRQ)		IN	0,1
Signal generation	(SIGGEN)	1 : automatically 2 : by wave action 3 : by hand 4 : by wind	EN	0,1
Signal group	(SIGGRP)		TE	0,1
Signal period	(SIGPER)		RE	0,1
Signal sequence	(SIGSEQ)		TE	0,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 15 : synchronized	EN	0,*
Value of maximum range	(VALMXR)		RE	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1

Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><b>INT 1 Reference:</b> R 1, 10-16, 20-22</p> <p><b>19.19.1 Fog signals (see S-4 – B-451-454)</b></p> <p>The term "fog signal" refers to the sound emitted, not the apparatus. Fog signals are short range aids to navigation, principally used as hazard warnings. For various reasons they are unreliable as indicators of position. Their importance relative to other aids to navigation has declined but they are still considered useful for the safe navigation of vessels with very limited (or non-functioning) electronic equipment. A fog signal should be shown on ENC's at an maximum display scale on which vessels may navigate within range.</p> <p>The position from which a fog signal is emitted is usually on a buoy, or close enough to a light to be treated as sounded from the same position as the light.</p> <p>If it is required to encode a fog signal, it must be done using the <b>feature Fog Signal</b>.</p> <p><b>Remarks:</b></p> <ul style="list-style-type: none"> <li>The characteristic rhythm of fog signals (other than those actuated by waves, which are irregular) may be more important than their type when mariners are attempting to identify them. The number of sound emissions (e.g. blasts, strokes) and the period must therefore be encoded, where known, using the <b>attributes signal group, signal period and signal sequence</b>.</li> <li>Where required, the attribute <b>signal frequency</b> must be quoted in Hertz, e.g. a signal frequency of 950 MHz must be encoded as <i>950000000</i>.</li> </ul> <p><b>Distinction:</b> Signal station, warning.</p>				

## 20 Radar, Radio

### 20.1 Automatic Identification Systems (AIS) (see S-4 – B-489)

#### 20.1.1 AIS equipped aids to navigation (see S-4 – B-489.1)

AIS signals used as an aid to navigation may:

- actually be transmitted from a physical aid to navigation (physical AIS aid to navigation);
- appear to be transmitted from a physical aid to navigation but is actually transmitted from an AIS base station (synthetic AIS aid to navigation); or
- be transmitted from an AIS base station to represent an aid to navigation where a physical aid to navigation does not exist (virtual AIS aid to navigation).

It is not required to encode AIS information on ENC's, as ENC's are intended to be used in conjunction with ECDIS as part of an Integrated Bridge System, in which AIS targets are displayed when in range. If, however, Producing Authority's wish to indicate the presence of a physical or synthetic AIS aid to navigation to aid in the route planning process or for use in ECS or other navigation systems, this may be done using the **complex** attribute **information** (sub-attribute **text**) on the physical aid to navigation structure (master) **feature** (see clause X.X), e.g. *Automatic Identification System (AIS) aid to navigation*.

It is currently (May 2012) not possible to encode virtual AIS aid to navigation information on ENC's.

## 20.2 Radio station

**IHO Definition:** **RADIO STATION.** A place equipped to transmit radio waves. Such a station may be either stationary or mobile, and may also be provided with a radio receiver. In British terminology, also called w/t station. (IHO Dictionary – S-32).

### **S-101 Geo Feature:** Radio station (RDOSTA)

#### **Primitives:** Point

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Call sign	(CALSGN)		TE	0,1
Category of radio station	(CATROS)	1 : circular (non-directional) marine or aero-marine radiobeacon 2 : directional radiobeacon 3 : rotating-pattern radiobeacon 4 : Consol-beacon 5 : radio direction-finding station 6 : coast-radio station providing QTG-service 7 : aeronautical radiobeacon 8 : Decca 9 : Loran C 10 : Differential GNSS 11 : Toran 12 : Omega 13 : Syledis 14 : Chaika (Chayka) 15 : radio telephone station	EN	0,1
Communication channel	(COMCHA)		TE	0,1
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Estimated range	(ESTRNG)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Orientation	(ORIENT)		RE	0,1
Signal frequency	(SIGFRQ)		IN	0,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent	EN	0,*

**Comment [j141]:** S-57 Extension 06/01.



		7 : temporary 8 : private		
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: S 10-16

#### 20.2.1 Radio stations (see S-4 – B-480-484)

Transmissions from radio stations may provide mariners with a line of position. Most radio position fixing systems require Radio Direction Finding (RDF) equipment to determine the bearing of the transmitting device; such equipment is generally no longer fitted on vessels. The exception is “emergency use only” VHF-based direction finding services (which do not use RDF equipment). Consequently, the following radio position-fixing stations are now obsolete and there is no longer any value in encoding them on ENC:

- Circular (non-directional) (RC), directional (RD) and rotating pattern (RW) marine radiobeacons;
- Consol beacons (Consol);
- Aeronautical radiobeacons (Aero RC);
- Radio direction-finding stations (except VHF-based emergency stations) (RG);
- Coast Radio Stations providing ‘QTG’ service (R).

The **feature** “radio station” is used to encode the point of transmission of the signal.

If it is required to encode a radio station, it must be done using the **feature Radio Station**.

#### Remarks:

- The **Radio Station** must only be used to encode the technical equipment itself, independent of the building or structure in which it is installed. If it is required to encode the building or structure (e.g. mast, tower, radar dome), it must be done using an appropriate **feature** (e.g. **Building**, **Landmark**).
- Further information (e.g. transmission characteristic) may be encoded using **complex** attributes **information** or **textual description**.
- Each VHF-channel should be indicated, using the attribute **communication channel**, in square brackets by 2 digits and up to 2 characters (A-Z); e.g. VHF channel 7 = [07], VHF channel 16 = [16]. The indication of several VHF-channels is possible, with each value being separated by a semicolon; e.g. VHF channels 7 and 16 = [07];[16].
- If it is required to encode a DGPS station, it must be done using **Radio Station**, with attribute **category of radio station** = 10 (Differential **GNSS**).
- Where required, the attribute **signal frequency** must be quoted in Hertz, e.g. a signal frequency of 950 MHz must be encoded as 950000000.

#### 20.2.2 Marine and aero-marine radiobeacons (see S-4 – B-481)

It is no longer useful to encode marine and aero-marine radiobeacons for ENCs.

If it is required to encode a marine and aero-marine radiobeacon, it must be done using a **Radio Station feature**, with attributes:

**category of radio station** - 1 - circular (omni-directional) marine or aero-marine radiobeacon

- 2 - directional radiobeacon
- 3 - rotating-pattern radiobeacon
- 4 - Consol beacon

**orientation** - value of the bearing from seaward. Applies only for **category of radio station = 2**.

Remarks:

- If it is required to encode the bearing line and the recommended track for a directional radiobeacon, it must be done as described in clause X.X. Where the bearing line coincides with a leading line defined by lights or other visual features making up a range system, navigation lines and recommended tracks must not be duplicated. The **features** making up the range system must be **aggregated using the collection feature C\_AGGR** (see clause X.X).

#### 20.2.3 Aeronautical radiobeacons (see S-4 – B-482)

It is no longer useful to encode aeronautical radiobeacons for ENCs.

If it is required to encode an aeronautical radiobeacon, it must be done using a **Radio Station feature**, with attribute **category of radio station = 7 (aeronautical radiobeacon)**. The identification signal may be encoded using the attribute **call sign**.

#### 20.2.4 Radio direction-finding stations (see S-4 – B-483)

If it is required to encode a radio direction-finding station, it must be done using a **Radio Station feature**, with attribute **category of radio station = 5 (radio direction-finding station)**. The identification signal may be encoded using the attribute **call sign**.

Remarks:

- Direction-finding is now only provided as an emergency service by VHF.

#### 20.2.5 Coast radio stations providing QTG service (see S-4 – B-484)

It is no longer useful to encode coast radio stations providing QTG services for ENCs.

If it is required to encode a coast radio station which provides a QTG service, it must be done using a **Radio Station feature**, with attribute **category of radio station = 6 (coast radio station providing QTG service)**.

Distinction: Radar station; radio calling-in point.

### 20.3 Radar transponder beacon

<b>IHO Definition:</b> <b>RADAR TRANSPONDER BEACON.</b> A transponder beacon transmitting a coded signal on radar frequency, permitting an interrogating craft to determine the bearing and range of the transponder. Also called racon. ( <i>IHO Dictionary – S-32</i> ).				
<b>S-101 Geo Feature:</b> Radar transponder beacon (RTPBCN)				
<b>Primitives:</b> Point				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of radar transponder beacon	(CATRTB)	1 : ramark, radar beacon transmitting continuously 2 : racon, radar transponder beacon 3 : leading racon/radar transponder beacon	EN	1,1
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Radar wave length	(RADWAL)		TE	0,1
Sector limit one	(SECTR1)		RE	0,1
Sector limit two	(SECTR2)		RE	0,1
Signal group	(SIGGRP)		TE	0,1
Signal sequence	(SIGSEQ)		TE	0,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private	EN	0,*
Value of maximum range	(VALMXR)		RE	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1

Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: S 2-3

#### 20.3.1 Radar beacons (see S-4 – B-486)

Radar beacons are transmitters operating in the marine radar frequency band. The signals produce a characteristic line on a vessel's radar display enabling the mariner to determine their position with greater certainty than would be possible by means of a normal radar display alone.

If it is required to encode a radar beacon, it must be done using the **feature Radar Transponder Beacon**.

##### Remarks:

- The **Radar Transponder Beacon** must only be used to encode the technical equipment itself, independent of the building or structure in which it is installed. If it is required to encode the building or structure (e.g. mast, tower, radar dome), it must be done using an appropriate **feature** (e.g. **Building, Landmark**).
- The attribute **signal group** is used to encode morse identification letter(s) for the radar beacon, where known.
- Leading racons are established such that, when their bearing lines are coincident on a vessel's radar display, the bearing serves to indicate the track to be followed. If it is required to encode the bearing line and the recommended track for leading racons, it must be done as described in clause X.X. Where the bearing line coincides with a leading line defined by lights or other visual features making up a range system, navigation lines and recommended tracks must not be duplicated. The **features** making up the range system must be aggregated using the **collection feature C\_AGGR** (see clause X.X).
- If, for some reason, the radar transponder beacon signal is obscured between certain bearings, this information should be encoded using the attributes **sector limit one** and **sector limit two** to encode the "visible" sector, as for lights (see clause X.X).
- The sweep period may be encoded using the **complex attribute information**.

Distinction: Radar line; radar range; radar station.

## 21 Services

### 21.1 Pilot boarding place

<b>IHO Definition:</b> <b>PILOT BOARDING PLACE.</b> A location offshore where a pilot may board a vessel in preparation to piloting it through local waters. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).				
<b>S-101 Geo Feature:</b> Pilot boarding place (PILBOP)				
<b>Primitives:</b> Point, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
<i>Call sign</i>	(CALSGN)		TE	0,1
Category of pilot boarding place	(CATPIL)	1 : boarding by pilot-cruising vessel 2 : boarding by helicopter 3 : pilot comes out from shore	EN	0,1
Communication channel	(COMCHA)		TE	0,1
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Pilot district	(PILDST)		TE	0,1
Pilot district in national language	(NPLDST)		TE	0,1
Status	(STATUS)	1 : permanent 2 : occasional 3 : recommended 5 : periodic/intermittent 6 : reserved 9 : mandatory 16 : watched 17 : un-watched 19 : buoyed	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1

**Comment [A142]:** S-57 Extension 06/01.

**Comment [j143]:** S-57 Extension 06/01.S-57 Extension 06/01.

Language		ISO 639-3	(S) T	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: T 1.1-4

#### 21.1.1 Pilot boarding places (see S-4 – B-491.1-2)

For a pilot boarding place, the pilot vessel may either cruise in the area or come out on request. Off some large ports pilots on outgoing ships may be disembarked at a different location. Pilots may board from a helicopter; it is then less important for a ship to reach the exact position of the boarding place but an approximate position should still be encoded. Some pilot stations are used solely for long-distance (deep-sea) pilots. Pilots may be in constant attendance, in regular attendance at certain limited times, or available by previous arrangement only. The primary purpose of encoded pilotage information is to show the position of the facility. Because of the many variations in the service provided, the main source of information on pilotage must be in an associated publication or product.

If it is required to encode a pilot boarding place, it must be done using the **feature Pilot Boarding Place**.

##### Remarks:

- Each VHF-channel should be indicated, using the attribute **communication channel**, in square brackets by 2 digits and up to 2 characters (A-Z); e.g. VHF channel 7 = [07], VHF channel 16 = [16]. The indication of several VHF-channels is possible, with each value being separated by a semicolon; e.g. VHF channels 7 and 16 = [07];[16].

#### 21.1.2 Pilot stations ashore (see S-4 – B-491.4)

If it is required to encode a pilot station **ashore**, it must be done using a **Building** or **Landmark feature**, with attribute **function** = 11 (pilot office) or 12 (pilot lookout).

##### Distinction:

## 21.2 Vessel traffic service area

**IHO Definition:** **VESSEL TRAFFIC SERVICE.** The area of any service implemented by a relevant authority primarily designed to improve safety and efficiency of traffic flow and the protection of the environment. It may range from simple information messages, to extensive organization of the traffic involving national or regional schemes. (IHO Dictionary – S-32).

### **S-101 Geo Feature:** Vessel traffic service area

#### **Primitives:** Surface

Real World		Paper Chart Symbol	ECDIS Symbol		
S-101 Attribute		S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Feature name				C	0,*
Category of name			1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language			ISO 639-3	(S) TE	0,1
Name		(OBJNAM)		(S) TE	1,1
Information				C	0,*
Language			ISO 639-3	(S) TE	0,1
Text		(INFORM)		(S) TE	1,1
Textual description				C	0,*
File reference		(TXTDSC)		(S) TE	1,1
Language			ISO 639-3	(S) TE	0,1
Scale maximum		(SCAMAX)	scale maximum < scale minimum	IN	0,1
Scale minimum		(SCAMIN)	scale minimum > scale maximum	IN	0,1
Recording date		(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication		(RECIND)		TE	0,1
Source indication				C	0,*
Authority				(S) TE	1,1
Nationality				(S) TE	1,1
ID code				(S) TE	0,1
Source				(S) TE	0,1
Source date		(SORDAT)	ISO 8601:1988	(S) DA	1,1

#### **INT 1 Reference:**

##### **21.2.1 Vessel traffic service area**

If it is required to encode an area within which a competent authority provides services to vessels as part of a Vessel Traffic Service, it must be done using the feature **Vessel Traffic Service Area**. The area should be captured based on the limits of the VTS or VTS sector.

#### **Remarks:**

- Separate area **Vessel Traffic System Area** features should be captured for individual VTS sectors where

appropriate.

Distinction: Custom zone.



### 21.3 Coastguard station

**IHO Definition:** **COASTGUARD STATION.** Watch keeping stations at which a watch is kept either continuously, or at certain times only. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.38, November 2000).

**S-101 Geo Feature:** Coastguard station (CGUSTA)

**Primitives:** Point

<i>Real World</i>		<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>	
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Status	(STATUS)	1 : permanent 4 : not in use 5 : periodic/intermittent 16 : watched 17 : un-watched	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<b>INT 1 Reference:</b> T 10, 11				

### 21.3.1 Coastguard stations (see S-4 – B-492)

The organisation of coast-watching and rescue services differs from country to country. For charting purposes it is assumed that two distinct functions can be recognised, even though they may be parts of the same organisation co-ordinating and effecting life saving and performing other services. Coastguard stations are stations at which a watch is kept either continuously, or at certain times only. They are sited so as to have a commanding view, are often associated with signal stations, and are visually prominent. They are also referred to as watch-keeping stations.

Coastguard stations are located along the coasts of most maritime nations. Their primary purpose in former days was to enforce customs regulations, observe the movements of ships and to watch for signs of distress at sea. These functions are largely superseded by modern telecommunications and Search & Rescue (SAR) arrangements, coordinated by regional Maritime Rescue and Coordination Centres (MRCC).

If it is required to encode a coastguard station, it must be done using the **feature** **Coastguard Station**.

#### Remarks:

- Many modern Coastguard services no longer maintain visual watch from fixed stations. However, because stations were usually situated so as to have a commanding view and may therefore be visually prominent and make good fixing marks, the buildings may still be encoded as **Building or Landmark**.
- The **Coastguard Station** must only be used to describe the function of the coastguard station, independent of the building or structure itself. If it is required to encode the building or structure in which the coastguard station operates, it must be done using an appropriate **feature** (e.g. **Building, Landmark**).
- Maritime Rescue and Coordination Centres (MRCC) are part of a constantly manned communications watch system. If it is required to encode a MRCC, it should be done using **Coastguard Station**, with **complex** attribute **information** (sub-attribute **text**) = *Maritime Rescue and Coordination Centre*. The name of the station may be populated using the **complex** attribute **feature name** (sub-attribute **name**), e.g. *MRCC Swansea*.

Distinction: Building, single; rescue station.

## 21.4 Warning signal stations

<b>IHO Definition:</b> <b>SIGNAL STATION, WARNING.</b> A signal station is a place on shore from which signals are made to ships at sea. (IHO Dictionary – S-32).				
<b>S-101 Geo Feature:</b> Signal station warning (SISTAW)				
<b>Primitives:</b> Point				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of signal station warning	(CATSIW)	1 : danger 2 : maritime obstruction 3 : cable 4 : military practice 5 : distress 6 : weather 7 : storm 8 : ice 9 : time 10 : tide 11 : tidal stream 12 : tide gauge 13 : tide scale 14 : diving 15 : water level gauge	EN	1,*
Communication channel	(COMCHA)		TE	0,1
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 12 : illuminated 14 : public 15 : synchronized 16 : watched 17 : un-watched	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1

Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: T 20, 26, 28-36

#### 21.4.1 Warning signal stations (see S-4 – B-494; B-496-7)

Signal stations communicating visually have declined in importance. They are encoded on the largest maximum display scale ENC data not only for their main role of signalling information and instructions but also as a form of landmark. The signals generally exhibit lights by day and night but may display shapes or flags by day.

If it is required to encode a warning signal station, it must be done using the feature **Signal Station Warning**.

##### Remarks:

- The **Signal Station Warning** must only be used to describe the function of the signal station, independent of the building or structure itself. If it is required to encode the building or structure housing the service, it must be done using an appropriate feature (e.g. **Building, Landmark**).
- Each VHF-channel should be indicated, using the attribute **communication channel**, in square brackets by 2 digits and up to 2 characters (A-Z); e.g. VHF channel 7 = [07], VHF channel 16 = [16]. The indication of several VHF-channels is possible, with each value being separated by a semicolon; e.g. VHF channels 7 and 16 = [07];[16].

Distinction: Signal station, traffic.

## 21.5 Traffic signal stations

**IHO Definition:** **SIGNAL STATION, TRAFFIC.** A signal station is a place on shore from which signals are made to ships at sea. (IHO Dictionary – S-32).

Traffic signal stations regulate the movement of traffic. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.155, November 2000).

### **S-101 Geo Feature:** Signal station traffic (SISTAT)

**Primitives:** Point

*Real World*

*Paper Chart Symbol*

*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of signal station traffic	(CATSIT)	1 : port control 2 : port entry and departure 3 : International Port Traffic 4 : berthing 5 : dock 6 : lock 7 : flood barrage 8 : bridge passage 9 : dredging 10 : traffic control light	EN	1,*
Communication channel	(COMCHA)		TE	0,1
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 12 : illuminated 14 : public 15 : synchronized 16 : watched 17 : un-watched	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*

File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: T 21-25.2

#### 21.5.1 Traffic signal stations (see S-4 – B-494-5)

Signal stations communicating visually have declined in importance. They are encoded on the largest maximum display scale ENC data not only for their main role of signalling information and instructions but also as a form of landmark. The signals generally exhibit lights by day and night but may display shapes or flags by day.

The nature of traffic signals varies from country to country and even from port to port. For charting purposes traffic signals can be considered to include:

- Port entry and departure signals;
- Lock, docking and berthing signals;
- Bridge signals;
- International traffic signals.

If it is required to encode a traffic signal station, it must be done using the feature **Signal Station Traffic**.

#### Remarks:

- If it is required to encode a bridge light marking the centre of a navigable span, it must be done using the feature **Light**.
- The **Signal Station Traffic** must only be used to describe the function of the signal station, independent of the building or structure itself. If it is required to encode the building or structure housing the service, it must be done using an appropriate feature (e.g. **Building, Landmark**).
- Each VHF-channel should be indicated, using the attribute **communication channel**, in square brackets by 2 digits and up to 2 characters (A-Z); e.g. VHF channel 7 = [07], VHF channel 16 = [16]. The indication of several VHF-channels is possible, with each value being separated by a semicolon; e.g. VHF channels 7 and 16 = [07];[16].

Distinction: Signal station, warning.

## 21.6 Rescue station

IHO Definition: <b>RESCUE STATION.</b> A place at which life saving equipment is held. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.140, November 2000).				
<b>S-101 Geo Feature:</b> Rescue station (RSCSTA)				
<b>Primitives:</b> Point				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of rescue station	(CATRSC)	1 : rescue station with lifeboat 2 : rescue station with rocket 4 : refuge for shipwrecked mariners 5 : refuge for intertidal area walkers 6 : lifeboat lying at a mooring 7 : aid radio station 8 : first aid equipment	EN	0,*
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 14 : public 16 : watched 17 : un-watched	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1

Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><b>INT 1 Reference:</b> T 12-14; Q 124</p> <p><b>21.6.1 Rescue station (see S-4 – B-490 and B-493)</b></p> <p>The organisation of coast-watching and rescue services differs from country to country. For charting purposes it is assumed that these two distinct functions can be recognised individually, even though they may be parts of the same organisation co-ordinating and effecting life saving and performing other services.</p> <p>Rescue stations are the places at which life saving equipment is held, especially lifeboats (usually in relatively sheltered positions, near sea level). Rescue stations are not necessarily visually prominent. The range of equipment used in rescue is wide, e.g. search and rescue helicopters; fast, long-distance lifeboats; inflatable inshore lifeboats.</p> <p>If it is required to encode a rescue station, it must be done using the <b>feature Rescue Station</b>.</p> <p><b>Remarks:</b></p> <ul style="list-style-type: none"> <li>• The <b>Rescue Station</b> must only be used to describe the function of the rescue station, independent of the building or structure itself. If it is required to encode the building or structure housing the service, it must be done using an appropriate <b>feature</b> (e.g. <b>Building, Landmark</b>).</li> <li>• If it is required to encode a refuge beacon, it must be done using a <b>Beacon Special Purpose/General feature</b>, with attribute <b>category of special purpose mark</b> = 44 (refuge beacon), not by using <b>Rescue Station</b>.</li> </ul> <p><b>Distinction:</b> Beacon special purpose/general; building single; coastguard station.</p>				



## 21.7 Harbour facility

IHO Definition: <b>HARBOUR FACILITY.</b> A Harbour installation with a service or commercial operation of public interest. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.81, November 2000).				
<b>S-101 Geo Feature:</b> Harbour facility (HRBFAC)				
<b>Primitives:</b> Point, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of harbour facility	(CATHAF)	1 : RoRo-terminal 3 : ferry terminal 4 : fishing harbor 5 : yacht harbor/marina 6 : naval base 7 : tanker terminal 8 : passenger terminal 9 : shipyard 10 : container terminal 11 : bulk terminal 12 : syncrolift 13 : straddle carrier 14 : service harbour	EN	1,*
Condition	(COND TN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
Date range			C	0,2
Date end		ISO 8601:1988	(S) DA	0,1
Date start		ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Nature of construction	(NATCON)	1 : masonry 2 : concreted 3 : loose boulders 6 : wooden 7 : metal 9 : painted	EN	0,*
Product	(PRODCT)	1 : oil 2 : gas 3 : water 4 : stone 5 : coal 6 : ore 7 : chemicals 8 : drinking water 9 : milk	EN	0,1

**Comment [j144]:** S-57  
Extension 06/01.

**Comment [A145]:** S-57  
Extension 06/01.

		10 : bauxite 11 : coke 12 : iron ingots 13 : salt 14 : sand 15 : timber 16 : sawdust/wood chips 17 : scrap metal 18 : liquefied natural gas (LNG) 19 : liquefied petroleum gas (LPG) 20 : wine 21 : cement 22 : grain		
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted <del>7 : entry prohibited</del> 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake <del>14 : area to be avoided</del> 15 : construction prohibited 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted <del>22 : removal of historical artefacts prohibited</del> 23 : cargo transshipment (lightening) prohibited 24 : dragging prohibited <del>25 : stopping prohibited</del> <del>26 : landing prohibited</del> 27 : speed restricted <del>28 : swimming prohibited</del>	EN	0,*
Status	(STATUS)	1 : permanent 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 9 : mandatory 12 : illuminated 13 : historic 14 : public 16 : watched 17 : un-watched	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*

**Comment [A146]:** S-57  
Extension 06/01.

**Comment [J147]:** S-57  
Extension 06/01.

File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: F 10, 11.1, 50

#### 21.7.1 Harbour facilities (see S-4 – B-320 and B-321.5)

If it is required to encode a harbour facility, it must be done using the **feature Harbour Facility**.

##### Remarks:

- Fishing harbours or ports are equipped to provide for the particular needs of fishing boats. Boat harbours and marinas are areas of sheltered water, generally within harbours or ports, set aside for the use of small craft, usually with moorings, buoys, and, in the case of marinas, berthing facilities.
- Depending on the navigational purpose, harbour facilities are defined by: an area including docks, basins, and dockside equipment; or a point.
- If it is required to encode a terminal with facilities to load/unload or store shipping containers, this should be done using **Harbour Facility** with attribute **category of harbour facility** = 10 (container terminal).
- If it is required to encode a covered terminal into which ships can go, this should be done using **Harbour Facility** with the purpose of the terminal defined by **category of harbour facility**. The roof of the terminal may be encoded using the attribute **nature of construction**, and the maximum height and/or draught of vessels able to use the terminal encoded using the **complex** attribute **information**. Alternatively, the roofed structure may be encoded using a **Building feature** (see clause X.X).

Distinction: Small craft facility.

## 21.8 Small craft facility

<b>IHO Definition:</b> <b>SMALL CRAFT FACILITY.</b> A place at which a service generally of interest to small craft or pleasure boats is available. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.162, November 2000).				
<b>S-101 Geo Feature:</b> Small craft facility (SMCFAC)				
<b>Primitives:</b> Point, Surface				
<i>Real World</i>	<i>Paper Chart Symbol</i>	<i>ECDIS Symbol</i>		
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of small craft facility	(CATSCF)	1 : visitors berth 2 : nautical club 3 : boat hoist 4 : sailmaker 5 : boatyard 6 : public inn 7 : restaurant 8 : chandler 9 : provisions 10 : doctor 11 : pharmacy 12 : water tap 13 : fuel station 14 : electricity 15 : bottle gas 16 : showers 17 : launderette 18 : public toilets 19 : post box 20 : public telephone 21 : refuse bin 22 : car park 23 : parking for boats and trailers 24 : caravan site 25 : camping site 26 : sewerage pump-out station 27 : emergency telephone 28 : landing/launching place for boats 29 : visitors mooring 30 : scrubbing berth 31 : picnic area 32 : mechanics workshop 33 : guard and/or security service	EN	1,*
Date range			C	0,1
Date end	(PEREND)	ISO 8601:1988	(S) DA	0,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	0,1
Periodic			(S) BO	1,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name	(S) EN	0,1

		5 : display name		
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Status	(STATUS)	1 : permanent 2 : occasional 3 : recommended 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 9 : mandatory 12 : illuminated 14 : public 16 : watched 17 : un-watched	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
<p><b>INT 1 Reference:</b> E 37.1-2; F 11.3, 19.2; Q 45; U 6-13, 15-31</p> <p><b>21.8.1 Small craft facilities (see S-4 – B-320.1-2)</b></p> <p>If it is required to encode a small craft facility, it must be done using the <b>feature Small Craft Facility</b>.</p> <p><b>Remarks:</b></p> <ul style="list-style-type: none"> <li>The <b>Small Craft Facility</b> must only be used to encode the function. In addition, if it is required to encode a physical object (e.g. building, mooring buoy), it must be done using an appropriate <b>feature</b> (e.g. <b>Building, Mooring/Warping Facility</b>).</li> </ul> <p><b>Distinction:</b> Building, single; harbour facility; shoreline construction.</p>				

## 22 Feature Attribute and Enumerate Descriptions

### 22.1 Beacon shape (BCNSHP)

**Beacon Shape:** IHO Definition: Describes the characteristic geometric form of the beacon. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

1) **Stake, pole, perch, post**

IHO Definition: An elongated wood or metal pole, driven into the ground or seabed, which serves as a navigational aid or a support for a navigational aid. (Adapted from IHO Dictionary – S-32).

**Comment [J148]:** MD8 - 7.Cl.12 and 7.Co.12.

2) **Withy**

IHO Definition: A tree without roots stuck or spoiled into the bottom of the sea to serve as a navigational aid. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.5, November 2000).

3) **Beacon tower**

IHO Definition: A solid structure of the order of 10 metres in height used as a navigational aid. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.5, November 2000).

4) **Lattice beacon**

IHO Definition: A structure consisting of strips of metal or wood crossed or interlaced to form a structure to serve as an aid to navigation or as a support for an aid to navigation. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.5, November 2000).

5) **Pile beacon**

IHO Definition: A long heavy timber(s) or section(s) of steel, wood, concrete, etc., forced into the seabed to serve as an aid to navigation or as a support for an aid to navigation. (Adapted from IHO Dictionary – S-32 and Navigation Dictionary, US National Oceanic and Atmospheric Administration - NOAA, 1969).

6) **Cairn**

IHO Definition: A mound of stones, usually conical or pyramidal, raised specifically for maritime navigation. (Adapted from IHO Dictionary – S-32).

7) **Buoyant beacon**

IHO Definition: A tall spar-like beacon fitted with a permanently submerged buoyancy chamber, the lower end of the body is secured to seabed sinker either by a flexible joint or by a cable under tension. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.5, November 2000).

Remarks:

- The beacon shape describes the characteristic geometric form of the beacon.

### 22.2 Building shape (BUISHP)

**Building shape:** IHO Definition:

5) **High-rise building**

IHO Definition: A building having many storeys. (The New Shorter Oxford English Dictionary, 1993).

6) **Pyramid**

IHO Definition: A polyhedron of which one face is a polygon of any number of sides, and the other faces are triangles with a common vertex. (The New Shorter Oxford English Dictionary, 1993).

7) **Cylindrical**

IHO Definition: Shaped like a cylinder, which is a solid geometrical figure generated by straight lines fixed in direction and describing with one of its points a closed curve, especially a circle. (The New Shorter Oxford English Dictionary, 1993).

8) **Spherical**

**IHO Definition:** Shaped like a sphere, which is a body the surface of which is at all points equidistant from the centre. (The New Shorter Oxford English Dictionary, 1993).

9) **Cubic**

**IHO Definition:** A shape the sides of which are six equal squares; a regular hexahedron. (The New Shorter Oxford English Dictionary, 1993).

## 22.3 Buoy shape (BOYSHP)

**Buoy shape:** **IHO Definition:** The principal shape and/or design of a buoy. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

1) **Conical (nun, ogival)**

**IHO Definition:** The upper part of the body above the water-line, or the greater part of the superstructure, has approximately the shape or the appearance of a pointed cone with the point upwards. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.7, November 2000).

2) **Can (cylindrical)**

**IHO Definition:** The upper part of the body above the water-line, or the greater part of the superstructure, has the shape of a cylinder, or a truncated cone that approximates to a cylinder, with a flat end uppermost. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.7, November 2000).

3) **Spherical**

**IHO Definition:** The upper part of the body above the water-line, or the greater part of the superstructure, has the shape of a part of a sphere. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.7, November 2000).

4) **Pillar**

**IHO Definition:** The upper part of the body above the water-line, or the greater part of the superstructure is a narrow vertical structure, pillar or lattice tower. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.7, November 2000).

5) **Spar (spindle)**

**IHO Definition:** The upper part of the body above the water-line, or the greater part of the superstructure, has the form of a pole, or of a very long cylinder, floating upright. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.7, November 2000).

6) **Barrel (tun)**

**IHO Definition:** The upper part of the body above the water-line, or the greater part of the superstructure, has the form of a barrel or cylinder floating horizontally. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.7, November 2000).

7) **Superbuoy**

**IHO Definition:** A very large buoy designed to carry a signal light of high luminous intensity at a high elevation. (IHO Dictionary – S-32).

8) **Ice buoy**

**IHO Definition:** A specially constructed shuttle shaped buoy which is used in ice conditions. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.7, November 2000).

**Remarks:**

- The principal shapes are those recommended in the International Association of Lighthouse Authorities - IALA System.

## 22.4 Buried depth (BURDEP)

**Buried depth:** **IHO Definition:** The depth below the seabed to which an object is buried. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.8, November 2000).

**Unit:** Defined in the HUNI subfield of the CRSHP record or the HUNITS attribute of the M\_UNIT meta feature:

metre (m)  
Resolution: 0-1m  
Format: xx.x  
Example: 2.5 for a depth of 2-5 metres

## 22.5 Call sign (CALSGN)

**Call sign:** IHO Definition: The designated call-sign of a radio station, pilot, ... (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.9, November 2000 (as amended)). **UP TO HERE 11/11/10. (Alternate definitions).**

**Comment [j149]:** MD8 – 5.Co.1.

**Comment [j150]:** S-57 Extension 06/01.

## 22.6 Category of airport/airfield (CATAIR)

**Category of airport/airfield:** IHO Definition:

### 1) Military aeroplane airport

IHO Definition: A large military airfield usually equipped with a control tower, hangars and accommodation for the receiving and discharging of passengers or cargo. (Adapted from The Macquarie Dictionary, 1988).

### 2) Civil aeroplane airport

IHO Definition: A large airfield usually equipped with a control tower, hangars and accommodation for the receiving and discharging of passengers or cargo. (The Macquarie Dictionary, 1988).

### 3) Military heliport

IHO Definition: A landing place for helicopters controlled by the military. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.10, November 2000).

### 4) Civil heliport

IHO Definition: A landing place for helicopters, often the roof of a building. (The Macquarie Dictionary, 1988).

### 5) Glider airfield

IHO Definition: An area of land set aside for the take-off and landing of gliders. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.10, November 2000).

### 6) Small planes airfield

IHO Definition: An area of land set aside for the take-off and landing of small aeroplanes. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.10, November 2000).

### 8) Emergency airfield

IHO Definition: An area of land set aside for the take-off and landing of aeroplanes or helicopters in times of emergency. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.10, November 2000).

## 22.7 Category of anchorage (CATACH)

**Category of anchorage:** IHO Definition:

### 1) Unrestricted anchorage

IHO Definition: An area in which vessels anchor or may anchor. (IHO Dictionary – S-32).

### 2) Deep water anchorage

IHO Definition: An area in which vessels of deep draught anchor or may anchor. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.11, November 2000).

### 3) Tanker anchorage

IHO Definition: An area in which tankers anchor or may anchor. (S-57 Edition 3.1, Appendix A – Chapter 2).



Page 2.11, November 2000).

4) **Explosives anchorage**

IHO Definition: An area set apart for anchored ships discharging or receiving explosives. (IHO Dictionary – S-32).

5) **Quarantine anchorage**

IHO Definition: An area where a vessel anchors when satisfying quarantine regulations. (IHO Dictionary – S-32).

6) **Seaplane anchorage**

IHO Definition: An area in which seaplanes anchor or may anchor. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.11, November 2000).

7) **Small craft anchorage**

IHO Definition: An area in which yachts and small boats anchor or may anchor. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.11, November 2000).

8) **Small craft mooring area**

IHO Definition: An area in which yachts and small boats moor. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.11, November 2000).

9) **Anchorage for periods up to 24 hours**

IHO Definition: An area in which vessels anchor or may anchor for periods of up to 24 hours. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.11, November 2000).

10) **Anchorage for a limited period of time**

IHO Definition: An area in which vessels may anchor for a period of time not to exceed a specific limit. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.11, November 2000).

## 22.8 Category of bridge (CATBRG)

**Category of bridge:** IHO Definition:

1) **Fixed bridge**

IHO Definition: A bridge having permanent horizontal and vertical alignment. (McGraw-Hill Dictionary of Scientific and Technical Terms, 3rd Edition, 1984).

2) **Opening bridge**

IHO Definition: A bridge that is closed when set for carrying road traffic and open when set to permit marine traffic to pass through the waterway it crosses. Modern opening (movable) bridges are either bascule, vertical lift or swing. (Adapted from McGraw-Hill Encyclopedia of Science and Technology, 7<sup>th</sup> Edition, 1992).

3) **Swing bridge**

IHO Definition: A movable bridge (or span thereof) which rotates in a horizontal plane about a vertical pivot to allow the passage of vessels. (Adapted from McGraw-Hill Encyclopedia of Science and Technology, 7th Edition, 1992).

4) **Lifting bridge**

IHO Definition: A movable bridge (or span thereof) which is capable of being lifted vertically to allow vessels to pass beneath. (Adapted from IHO Dictionary – S-32).

5) **Bascule bridge**

IHO Definition: A counterpoise bridge rotated in a vertical plane about an axis at one or both ends. Also called a balance bridge. (IHO Dictionary – S-32).

6) **Pontoon bridge**

IHO Definition: A fixed floating bridge supported by pontoons. (McGraw-Hill Dictionary of Scientific and Technical Terms, 3rd Edition, 1984).

7) **Draw bridge**

IHO Definition: A general name for bridges of which part or the entire span of the bridge may be raised or drawn aside to allow ships to pass through. (IHO Dictionary – S-32).

8) **Transporter bridge**

IHO Definition: Consists of towers on each side of the watercourse connected by a system of girders on which a carriage runs. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

9) **Footbridge**

IHO Definition: A bridge structure used only for pedestrian traffic. (McGraw-Hill Dictionary of Scientific and Technical Terms, 3rd Edition, 1984).

10) **Viaduct**

IHO Definition: A long bridge consisting of a series of beams, spans or girders (of steel, timber or concrete) supported on towers or piers and used to carry a road, railroad, etc. (Adapted from McGraw-Hill Encyclopedia of Science and Technology, 7<sup>th</sup> Edition, 1992).

11) **Aqueduct**

IHO Definition: A bridge supporting an artificially elevated channel, for the conveyance of water. (Adapted from The New Shorter Oxford English Dictionary, 1993).

12) **Suspension bridge**

IHO Definition: A fixed bridge consisting of either a roadway or a truss suspended from two or more cables which pass over towers and are anchored by backstays to a firm foundation. (McGraw-Hill Encyclopaedia of Science and Technology, 7th Edition, 1992).

## 22.9 Category of built-up area (CATBUA)

**Category of built-up area:** IHO Definition:

1) **Urban area**

IHO Definition: An area predominantly occupied by man-made structures used for residential, commercial, and industrial purposes. (Nautical Chart Manual, US Department of Commerce, 1992).

2) **Settlement**

IHO Definition: A continuously occupied concentration of tents or lightweight fixed structures (for example: huts) serving as residences. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

3) **Village**

IHO Definition: A self-contained group of houses and associated buildings, usually in a country area. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

4) **Town**

IHO Definition: An inhabited place larger and more regularly built and with more complete and independent local government than a village but not incorporated as a city. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

5) **City**

IHO Definition: A major town inhabited by a large permanent community with all essential services. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

6) **Holiday village**

IHO Definition: A complex for holiday-makers with cottages, shops, and entertainment, on site, which is mainly populated on a seasonal basis. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

## 22.10 Category of cable (CATCBL)

### Category of cable: IHO Definition:

#### 1) Power line

IHO Definition: A cable that transmits or distributes electrical power. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

#### 3) Transmission line

IHO Definition: Multiple un-insulated cables usually supported by steel lattice towers. Such features are generally more prominent than normal power lines. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.16, November 2000).

#### 4) Telephone

IHO Definition: A cable that transmits telephone signals. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

#### 5) Telegraph

IHO Definition: A cable that transmits telegraph signals. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

#### 6) Mooring cable/chain

IHO Definition: A cable or chain used to secure a mooring buoy or other floating structure. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.16, November 2000).

## 22.11 Category of canal (CATCAN)

### Category of canal: IHO Definition:

#### 1) Transportation

IHO Definition: A canal used for navigation as part of a transport system. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.17, November 2000).

#### 2) Drainage

IHO Definition: A canal used to drain excess water from surrounding land. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.17, November 2000).

#### 3) Irrigation

IHO Definition: A canal used to supply water for the purpose of irrigation. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.17, November 2000).

## 22.12 Category of cardinal mark (CATCAM)

**Category of cardinal mark:** IHO Definition: The four quadrants (north, east, south and west) are bounded by the true bearings NW-NE, NE-SE, SE-SW and SW-NW taken from the point of interest.

A cardinal mark is named after the quadrant in which it is placed.

The name of the cardinal mark indicates that it should be passed to the named side of the mark. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.18, November 2000).

#### 1) North cardinal mark

#### 2) East cardinal mark

#### 3) South cardinal mark

#### 4) West cardinal mark

#### Remarks:

- Cardinal marks do not have a distinctive shape but are normally pillar or spar. **To conform to the IALA Maritime**

**Buoyage System**, they are always painted in yellow and black horizontal bands and their distinctive double cone top-marks are always black. (Note that such top-marks are encoded as separate **Topmark features**). Cardinal marks may also have a special system of flashing white lights and if such lights are fitted they are encoded as separate **Light features**.

### 22.13 Category of checkpoint (CATCHP)

**Category of checkpoint:** IHO Definition:

1) **Custom**

IHO Definition: Serves as a government checkpoint where customs duties are collected, the flow of goods are regulated and restrictions enforced, and shipments or vehicles are cleared for entering or leaving a country. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

### 22.14 Category of coastline (CATCOA)

**Category of coastline:** IHO Definition:

1) **Steep coast**

IHO Definition: A coast backed by rock or earth cliffs, which gives a good radar return and is useful for visual identification from a considerable distance off, where cliffs alternate with low lying coast along the shoreline. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.20, November 2000).

2) **Flat coast**

IHO Definition: A level coast with no obvious topographic features. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.20, November 2000).

3) **Sandy shore**

IHO Definition: A shoreline area made up of sand, i.e. loose material consisting of small but easily distinguishable, separate grains, between 0.0625 and 2.000 millimetres in diameter. (Adapted from *IHO Dictionary – S-32*).

4) **Stony shore**

IHO Definition: A shoreline area made up of rock and rock fragments ranging in size from pebbles and gravel to boulders or large rock masses. (Adapted from *IHO Dictionary – S-32*).

5) **Shingly shore**

IHO Definition: A shoreline area made up of rounded, often flat waterworn rock fragments larger than approximately 16 millimetres. (Adapted from *IHO Dictionary – S-32*).

6) **Glacier, seaward end**

IHO Definition: Projecting seaward extension of glacier, usually afloat. Also called glacier tongue. (*IHO Dictionary – S-32*).

7) **Mangrove**

IHO Definition: One of several genera of tropical trees or shrubs which produce many prop roots and grow along low lying coasts into shallow water. (*IHO Dictionary – S-32*).

8) **Marshy shore**

IHO Definition: A shoreline area made up of spongy land saturated with water. It may have a shallow covering of water, usually with a considerable amount of vegetation appearing above the surface. (Adapted from *IHO Dictionary – S-32*).

9) **Coral reef**

IHO Definition: A reef, often of large extent, composed chiefly of coral and its derivatives. (*IHO Dictionary – S-32*).

10) **Ice coast**

**IHO Definition:** A vertical cliff forming the seaward edge of an ice shelf, ranging in height between 2 metres to 50 metres or more above sea level. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.21, November 2000).

11) **Shelly shore**

**IHO Definition:** A shoreline area made up of shells, i.e. made up of the hard outside covering of marine animals. (Adapted from IHO Dictionary – S-32).

## 22.15 Category of control point (CATCTR)

**Category of control point:** IHO Definition:

1) **Triangulation point**

**IHO Definition:** A recoverable point on the earth, whose geographic position has been determined by angular methods with geodetic instruments. A triangulation point is a selected point, which has been marked with a station mark, or it is a conspicuous natural or artificial object. Also called trigonometric station or triangulation station. (IHO Dictionary – S-32).

2) **Observation spot**

**IHO Definition:** A point used by surveyors for determining precise position by astronomical means. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.22, November 2000).

3) **Fixed point**

**IHO Definition:** A point whose position has been accurately determined and plotted. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.22, November 2000).

4) **Benchmark**

**IHO Definition:** A permanent, stable object containing a marked point of known elevation with respect to a datum used as a reference level for tidal observations or as a control point for leveling. (IHO Dictionary – S-32).

5) **Boundary Mark**

**IHO Definition:** A marker identifying the location of a surveyed boundary line. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

6) **Horizontal control, main station**

**IHO Definition:** A station in a network of permanently marked control points having their geographic positions established to form third order accuracy or better. (Canadian Hydrographic Service, Survey Standing Order, 3.1-85).

7) **Horizontal control, secondary station**

**IHO Definition:** A station in a network of control points of a localized nature utilized for shoreline plots, sounding marks, stadia work, etc., whose geographic position may be established to a slightly lower order than main control points. (Canadian Hydrographic Service, Survey Standing Order, 3.1-85).

## 22.16 Category of conveyor (CATCON)

**Category of conveyor:** IHO Definition:

1) **Aerial cableway (telepheric)**

**IHO Definition:** A transportation system consisting of load cables strung between pylons on which carrier units (for example: cars or buckets intended to transport people, material, and/or equipment) are suspended. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

2) **Belt conveyor**

**IHO Definition:** A conveyor along which material or people are transported by means of a moving belt. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.23, November 2000).

3) **Flume**

**IHO Definition:** An artificial channel, usually an inclined chute or trough, for carrying water to furnish power, transport logs down a mountainside, etc. (Websters New World Dictionary Third College Edition).

**Comment [j151]:** S-57  
Extension 06/01.

## 22.17 Category of crane (CATCRN)

**Category of crane:** IHO Definition:

### 2) Container crane/gantry

IHO Definition: A high speed, shore-based crane used in the lift-on/lift-off operation of specially constructed containers. (Adapted from Nautical Chart Manual, US Department of Commerce, Coast and Geodetic Survey, 7th Edition).

### 3) Sheerlegs

IHO Definition: A tripodal structure used in dockyards and harbours for stepping masts or lifting loads in to and out of vessels. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.25, November 2000).

### 4) Travelling crane

IHO Definition: A crane mounted on rails (track) that can move (usually parallel to the wharf face) in order to load and unload cargo vessels. (Canadian Hydrographic Service).

### 5) A-frame

IHO Definition: A type of crane shaped like the letter “A”. They are often positioned on river banks or the coastline and are used for lifting logs from logging trucks and depositing them in the water. (Canadian Hydrographic Service).

## 22.18 Category of dam (CATDAM)

**Category of dam:** IHO Definition:

### 1) Weir

IHO Definition: A dam erected across a river to raise the level of the water. A fence of stakes set in a river or along the shore as a trap for fish. The word is now restricted to smaller works, the larger are called dams. (IHO Dictionary – S-32).

### 2) Dam

IHO Definition: A barrier to check or confine anything in motion; particularly one constructed to hold back water and raise its level to form a reservoir, or to prevent flooding. (IHO Dictionary – S-32).

### 3) Flood barrage

IHO Definition: An opening dam across a channel which, when required, is closed to control flood waters. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.26, November 2000).

## 22.19 Category of distance mark (CATDIS)

**Category of distance mark:** IHO Definition:

### 1) Distance mark not physically installed

IHO Definition: A point at which a distance from an origin along a feature is given for information, but at which no specific marker exists. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.27, November 2000).

### 2) Visible mark, pole

IHO Definition: A point at which a distance from an origin along a feature is given for information and which is marked by a pole. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.27, November 2000).

### 3) Visible mark, board

IHO Definition: A point at which a distance from an origin along a feature is given for information and which is

marked by a board. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.27, November 2000).

4) **Visible mark, unknown shape**

IHO Definition: A point at which a distance from an origin along a feature is given for information and which is physically marked, but the shape of the mark is not known or not given. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.27, November 2000).

## 22.20 Category of dock (CATDOC)

**Category of dock:** IHO Definition:

1) **Tidal**

IHO Definition: A dock which is open to the sea and in which the water level is affected by tides. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.28, November 2000).

2) **Non-tidal (wet dock)**

IHO Definition: A dock in which water can be maintained at any level by closing a gate when the water is at the desired level. (IHO Dictionary – S-32).

## 22.21 Category of dumping ground (CATDPG)

**Category of dumping ground:** IHO Definition:

2) **Chemical waste dumping ground**

IHO Definition: An area at sea where chemical waste is dumped. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.29, November 2000).

3) **Nuclear waste dumping ground**

IHO Definition: An area at sea where nuclear waste is dumped. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.29, November 2000).

4) **Explosives dumping ground**

IHO Definition: An area at sea where explosives are dumped. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.29, November 2000).

5) **Spoil ground**

IHO Definition: A sea area where dredged material is deposited. Also called dumping ground. (IHO Dictionary – S-32).

6) **Vessel dumping ground**

IHO Definition: An area at sea where disused vessels are scuttled. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.29, November 2000).

## 22.22 Category of fence/wall (CATFNC)

**Category of fence/wall:** IHO Definition:

1) **Fence**

IHO Definition: A man-made barrier of relatively light structure used as an enclosure or boundary. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

3) **Hedge**

IHO Definition: A continuous growth of shrubbery planted as a fence, a boundary or a wind break. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

4) **Wall**

**IHO Definition:** A solid man-made barrier of generally heavy material used as an enclosure, boundary, or for protection. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

### 22.23 Category of ferry (CATFRY)

**Category of ferry:** IHO Definition:

1) **“Free moving” ferry**

IHO Definition: A ferry which may have routes that vary with weather, tide and traffic. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.32, November 2000).

2) **Cable ferry**

IHO Definition: A ferry that follows a fixed route guided by a cable. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.32, November 2000).

3) **Ice ferry**

IHO Definition: A winter-time ferry which crosses a lead. (Finnish Maritime Administration).

Remarks:

- The attribute “category of ferry” does not encode the various types of ferry vessel, but the manoeuvrability of the ferry. The value “cable ferry” indicates a ferry that follows a fixed route guided by a cable. A cable ferry may hinder the flow of other traffic.

### 22.24 Category of fishing facility (CATFIF)

**Category of fishing facility:** IHO Definition:

1) **Fishing stake**

IHO Definition: A pole or stake placed in shallow water to outline a fishing ground or to catch fish. (IHO Dictionary – S-32).

2) **Fish trap**

IHO Definition: A structure (usually portable) for catching fish. (Adapted from IHO Dictionary – S-32).

3) **Fish weir**

IHO Definition: A fence of stakes or stones set in a river or along the shore to trap fish. (Adapted from IHO Dictionary – S-32).

4) **Tunny net**

IHO Definition: A net built at sea for catching tunny. (IHO Dictionary – S-32).

### 22.25 Category of fog signal (CATSIG)

**Category of fog signal:** IHO Definition:

1) **Explosive**

IHO Definition: A signal produced by the firing of explosive charges. (Admiralty List of Lights and Fog Signals).

2) **Diaphone**

IHO Definition: A diaphone uses compressed air and generally emits a powerful low-pitched sound, which often concludes with a brief sound of suddenly lowered pitch, termed the “grunt”. (Admiralty List of Lights and Fog Signals).

3) **Siren**

IHO Definition: A siren uses compressed air and exists in a variety of types which differ considerably in their sound and power. (Admiralty List of Lights and Fog Signals).



4) **Nautophone**

IHO Definition: A horn having a diaphragm oscillated by electricity (IHO Dictionary – S-32).

5) **Reed**

IHO Definition: A reed uses compressed air and emits a weak, high pitched sound. (Admiralty List of Lights and Fog Signals).

6) **Tyfon**

IHO Definition: A diaphragm horn which operates under the influence of compressed air or steam (IHO Dictionary – S-32).

7) **Bell**

IHO Definition: A ringing sound with a short range. The apparatus may be operated automatically, by hand or by wave action. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.34, November 2000).

8) **Whistle**

IHO Definition: A distinctive sound made by a jet of air passing through an orifice. The apparatus may be operated automatically, by hand or by air being forced up a tube by waves acting on a buoy. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.34, November 2000).

9) **Gong**

IHO Definition: A sound produced by vibration of a disc when struck. The apparatus may be operated automatically, by hand or by wave action. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.34, November 2000).

10) **Horn**

IHO Definition: A horn uses compressed air or electricity to vibrate a diaphragm and exists in a variety of types which differ greatly in their sound and power. (Admiralty List of Lights and Fog Signals).

Remarks:

- The attribute “category of fog signal” encodes the various means of generating the signal. The classification “horn” is the generic term for fog signals “nautophone”, “reed” and “tyfon”.

**22.26 Category of fortified structure (CATFOR)****Category of fortified structure:** IHO Definition:1) **Castle**

IHO Definition: A large fortified building or structure. (Adapted from The Collins Dictionary).

2) **Fort**

IHO Definition: A fortified enclosure, building, or position able to be defended against an enemy. (The Collins Dictionary).

3) **Battery**

IHO Definition: A fortified structure on which artillery is mounted. (The Collins Dictionary).

4) **Blockhouse**

IHO Definition: A concrete structure strengthened to give protection against enemy fire, with apertures to allow defensive gunfire. (The Collins Dictionary).

5) **Fortified tower**

IHO Definition: A small circular fort with very thick walls (e.g. Martello tower). (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

6) **Redoubt**

IHO Definition: An outwork or fieldwork usually square or polygonal and without flanking defences. (Concise Oxford Dictionary).

**Comment [j152]:** MD8 – 7.Co.1

8) **Fortified submarine shelter**

IHO Definition: Not currently defined.

**22.27 Category of gate (CATGAT)**

**Category of gate:** IHO Definition:

2) **Flood barrage gate**

IHO Definition: An opening gate used to control flood water. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

3) **Caisson**

IHO Definition: A steel structure used for closing the entrance of locks, wet and dry docks. (IHO Dictionary – S-32).

4) **Lock gate**

IHO Definition: The massive hinged doors at each end of a lock. (Adapted from IHO Dictionary – S-32).

5) **Dyke gate**

IHO Definition: An opening gate in a dyke. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

6) **Sluice**

IHO Definition: A sliding gate or other contrivance for changing the level of a body of water by controlling the flow into or out of it. (IHO Dictionary – S-32).

**22.28 Category of harbour facility (CATHAF)**

**Category of harbour facility:** IHO Definition:

1) **RoRo terminal**

IHO Definition: A terminal for roll-on roll-off ferries. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.38, November 2000).

3) **Ferry terminal**

IHO Definition: A terminal for passenger and vehicle ferries. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.38, November 2000).

4) **Fishing harbour**

IHO Definition: A harbour with facilities for fishing boats. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.38, November 2000).

5) **Yacht harbour/marina**

IHO Definition: A harbour facility for small boats, yachts, etc., where supplies, repairs, and various services are available. (IHO Dictionary – S-32).

6) **Naval base**

IHO Definition: A centre of operations for naval vessels. (Adapted from The Collins Dictionary).

7) **Tanker terminal**

IHO Definition: A terminal for the bulk handling of liquid cargoes. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.38, November 2000).

8) **Passenger terminal**

IHO Definition: A terminal for the loading and unloading of passengers. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.38, November 2000).

9) <b>Shipyard</b>	
<u>IHO Definition:</u>	A place where ships are built or repaired (IHO Dictionary – S-32).
10) <b>Container terminal</b>	
<u>IHO Definition:</u>	A terminal with facilities to load/unload or store shipping containers (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.38, November 2000, as amended).
11) <b>Bulk terminal</b>	
<u>IHO Definition:</u>	A terminal for the handling of bulk materials such as iron ore, coal, etc. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.38, November 2000).
12) <b>Syncrolift</b>	
<u>IHO Definition:</u>	A platform powered by synchronous electric motors used to lift vessels (larger than boats) in and out of the water. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.38, November 2000).
13) <b>Straddle carrier</b>	
<u>IHO Definition:</u>	A wheeled vehicle designed to lift and carry containers or vessels within its own framework. It is used for moving, and sometimes stacking, shipping containers and vessels. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.39, November 2000).
14) <b>Service harbour</b>	
<u>IHO Definition:</u>	A harbour within which the floating equipment (dredges, tugs ...) of harbour services are stationed.

**Comment [J153]:** MD8 – 7.Cl.5 and 7.Co.17.

**Comment [J154]:** S-57 Extension 06/01.

## 22.29 Category of hulk (CATHLK)

<b>Category of hulk:</b>	<u>IHO Definition:</u>
1) <b>Floating restaurant</b>	
<u>IHO Definition:</u>	A permanently moored floating structure (for example: an old ship) that is used as a restaurant. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).
2) <b>Historic ship</b>	
<u>IHO Definition:</u>	A ship of historical interest permanently moored as a tourist attraction. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).
3) <b>Floating museum</b>	
<u>IHO Definition:</u>	A permanently moored floating structure (for example: an old ship) that is used as a museum. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).
4) <b>Floating accommodation</b>	
<u>IHO Definition:</u>	A permanently moored floating structure (for example: an old ship) that is used for accommodation. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).
5) <b>Floating breakwater</b>	
<u>IHO Definition:</u>	A permanently moored floating structure, often constructed from old ships, used as a breakwater. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.40, November 2000).

## 22.30 Category of ice (CATICE)

<b>Category of ice:</b>	<u>IHO Definition:</u>
1) <b>Fast Ice</b>	
<u>IHO Definition:</u>	Sea ice which remains fast, generally in the position where originally formed, and which may attain a considerable thickness. It is found along coasts, where it is attached to the shore, or over shoals, where it may be held in position by islands, grounded icebergs or grounded polar ice. (IHO Dictionary – S-32).

5) **Glacier**

IHO Definition: A mass of snow and ice continuously moving from higher to lower ground or, if afloat, continuously spreading. (IHO Dictionary – S-32).

8) **Polar ice**

IHO Definition: Sea ice that is more than one year old (in contrast to winter ice). The WMO code defines polar ice as any sea ice more than one year old and more than 3 metres thick. (IHO Dictionary – S-32).

**22.31 Category of installation buoy (CATINB)**

**Category of installation buoy:** IHO Definition:

1) **Catenary anchor leg mooring (CALM)**

IHO Definition: Incorporates a large buoy which remains on the surface at all times and is moored by 4 or more anchors. Mooring hawsers and cargo hoses lead from a turntable on top of the buoy, so that the buoy does not turn as the ship swings to wind and stream.

2) **Single buoy mooring (SBM)**

IHO Definition: A mooring structure used by tankers to load and unload in port approaches or in offshore oil and gas fields. The size of the structure can vary between a large mooring buoy and a manned floating structure. Also known as single point mooring (SPM) (IHO Dictionary – S-32).

**22.32 Category of land region (CATLND)**

**Category of land region:** IHO Definition:

1) **Fen**

IHO Definition: A type of bog, especially a low-lying area, wholly or partly covered with water and dominated by grasslike plants, grasses, sedges and reeds. (The New Encyclopaedia Britannica, 15th Edition 1991).

2) **Marsh**

IHO Definition: An area of wet, often spongy ground that is subject to frequent flooding or tidal inundations, but not considered to be continually under water. It is characterized by the growth of non woody plants and by the lack of trees. (Nautical Chart Manual, US National Oceanic and Atmospheric Administration - NOAA, 1992).

3) **Moor/bog**

IHO Definition: Wet spongy ground consisting of decaying vegetation, which retains stagnant water, too soft to bear the weight of any heavy body. (IHO Dictionary – S-32).

4) **Heathland**

IHO Definition: A tract of wasteland; peat bog, usually covered by a low scrubby growth, but may have scattered small open water holes. (Nautical Chart Manual, US National Oceanic and Atmospheric Administration - NOAA, 1992).

5) **Mountain range**

IHO Definition: A series of connected and aligned mountains or mountain ridges. (US National Oceanic and Atmospheric Administration - NOAA, 1992).

6) **Lowlands**

IHO Definition: Low and relatively level land at a lower elevation than adjoining areas. (US National Oceanic and Atmospheric Administration - NOAA, 1992).

7) **Canyon lands**

IHO Definition: A relatively narrow, deep depression with steep sides, the bottom of which generally has a continuous slope. (IHO Dictionary – S-32).

8) **Paddy field**

IHO Definition: A piece of land set aside for crops which are periodically flooded (e.g. rice paddy). (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.44, November 2000).

9) **Agricultural land**

IHO Definition: Of or pertaining to the science or practice of cultivating the soil and rearing animals. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

10) **Savanna/grassland**

IHO Definition: An open grassy plain with few or no trees in a tropical or subtropical region; a tract covered mainly by grasses that have little or no woody tissue. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

11) **Parkland**

IHO Definition: A piece of ground kept for ornament and/or recreation or maintained in its natural state as a public property or area. (Websters New Collegiate Dictionary 1975).

12) **Swamp**

IHO Definition: An area of spongy land saturated with water. It may have a shallow covering of water, usually with a considerable amount of vegetation appearing above the surface. (IHO Dictionary – S-32).

13) **Landslide**

IHO Definition: (or landslide). The sliding down of a mass of land on a mountain or cliff-side; land which has so fallen. (IHO Dictionary – S-32).

14) **Lava flow**

IHO Definition: The substance that results from the cooling of molten rock. (Adapted from IHO Dictionary – S-32).

15) **Salt pan**

IHO Definition: Shallow pools of brackish water used for the natural evaporation of sea water to obtain salt. (IHO Dictionary – S-32).

16) **Moraine**

IHO Definition: Any accumulation of loose material deposited by a glacier. (Marine Chart Manual, US National Oceanic and Atmospheric Administration - NOAA, 1992).

17) **Crater**

IHO Definition: Bowl-shaped cavity, at the summit or on the side of a volcano. (IHO Dictionary – S-32). Also a hole formed by the impact of a meteor. (Nautical Chart Manual, US National Oceanic and Atmospheric Administration - NOAA, 1992).

18) **Cave**

IHO Definition: A natural underground chamber or series of chambers open to the surface. (Merriam-Webster On-line Dictionary, March 2010).

19) **Rock column or pinnacle**

IHO Definition: Any high tower or spire-shaped pillar of rock, alone or cresting a summit. (IHO Dictionary – S-32).

20) **Cay**

IHO Definition: A small insular feature usually with scant vegetation; usually of sand or coral. Often applied to smaller coral shoals. (United Kingdom Hydrographic Office – UKHO – The Mariners Handbook).

Remarks:

- The attribute “category of land region” encodes general terms for describing landscapes.

## 22.33 Category of landmark (CATLMK)

### Category of landmark: IHO Definition:

#### 1) Cairn

IHO Definition: A mound of stones, usually conical or pyramidal, raised as a landmark or to designate a point of importance in surveying. (IHO Dictionary – S-32).

#### 2) Cemetery

IHO Definition: A site and associated structures devoted to the burial of the dead. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

#### 3) Chimney

IHO Definition: A vertical structure containing a passage or flue for discharging smoke and gases of combustion. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

#### 4) Dish aerial

IHO Definition: A parabolic aerial for the receipt and transmission of high frequency radio signals. (IHO Dictionary – S-32).

#### 5) Flagstaff (flagpole)

IHO Definition: A staff or pole on which a flag is raised. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

#### 6) Flare stack

IHO Definition: A tall structure used for burning-off waste oil or gas. (IHO Dictionary – S-32). Normally showing a flame and located at refineries. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.45, November 2000).

#### 7) Mast

IHO Definition: A relatively tall structure usually held vertical by guy lines. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.45, November 2000).

#### 8) Windsock

IHO Definition: A tapered fabric sleeve mounted so as to catch and swing with the wind, thus indicating the wind direction. (Navigation Dictionary, US National Oceanic and Atmospheric Administration - NOAA, 1969).

#### 9) Monument

IHO Definition: A marker erected and/or maintained as a memorial to a person and/or event. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

#### 10) Column (pillar)

IHO Definition: A cylindrical or slightly tapering body of considerably greater length than diameter erected vertically. (Oxford English Dictionary).

#### 11) Memorial plaque

IHO Definition: A slab of metal, usually ornamented, erected as a memorial to a person or event. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.46, November 2000).

#### 12) Obelisk

IHO Definition: A tapering shaft usually of stone or concrete, square or rectangular in section, with a pyramidal apex. (Adapted from Oxford English Dictionary).

#### 13) Statue

IHO Definition: A representation of a living being, sculptured, moulded, or cast in a variety of materials (for example: marble, metal, or plaster). (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

#### 14) Cross

IHO Definition: A monument, or other structure in form of a cross. (Funk & Wagnalls Dictionary).

15) **Dome**

IHO Definition: A landmark comprising a hemispherical or spheroidal shaped structure. (Adapted from the Macquarie Dictionary).

16) **Radar scanner**

IHO Definition: A device used for directing a radar beam through a search pattern. (Adapted from Navigation Dictionary, US National Oceanic and Atmospheric Administration - NOAA, 1969).

17) **Tower**

IHO Definition: A relatively tall, narrow structure that may either stand alone or may form part of another structure. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

18) **Windmill**

IHO Definition: A system of vanes attached to a tower and driven by wind (excluding wind turbines). (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

19) **Windmotor**

IHO Definition: A tower and associated equipment that generates electrical power from wind. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

20) **Spire/minaret**

IHO Definition: A tall conical or pyramid-shaped structure often built on the roof or tower of a building, especially a church or mosque. (Adapted from The New Shorter Oxford English Dictionary, 1993).

21) **Large rock or boulder on land**

IHO Definition: An isolated rocky formation or a single large stone (Adapted from IHO Dictionary – S-32).

## 22.34 Category of lateral mark (CATLAM)

**Category of lateral mark:** IHO Definition:

1) **Port-hand lateral mark**

IHO Definition: Indicates the port boundary of a navigational channel or suggested route when proceeding in the "conventional direction of buoyage". (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.47, November 2000).

2) **Starboard-hand lateral mark**

IHO Definition: Indicates the starboard boundary of a navigational channel or suggested route when proceeding in the "conventional direction of buoyage". (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.47, November 2000).

3) **Preferred channel to starboard lateral mark**

IHO Definition: At a point where a channel divides, when proceeding in the "conventional direction of buoyage", the preferred channel (or primary route) is indicated by a modified port-hand lateral mark. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.47, November 2000).

4) **Preferred channel to port lateral mark**

IHO Definition: At a point where a channel divides, when proceeding in the "conventional direction of buoyage", the preferred channel (or primary route) is indicated by a modified starboard-hand lateral mark. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.47, November 2000).

Remarks:

- There are two international buoyage regions, A and B, between which lateral marks differ. The buoyage region is encoded using the separate attribute **marks navigational – system of** (see clause X.X). When top-marks, retro reflectors and/or lights are fitted to these marks, they are encoded as separate **features**.
- The "conventional direction of buoyage" may be either the general direction taken by the mariner when approaching a harbour, river, estuary or other waterway from seaward, or the direction determined by the proper authority, which in principle follows a clockwise direction around land masses.

## 22.35 Category of light (CATLIT)

### Category of light: IHO Definition:

#### 1) Directional function

IHO Definition: A light illuminating a sector of very narrow angle and intended to mark a direction to follow. (IHO Dictionary – S-32).

#### 4) Leading light

IHO Definition: A light associated with other lights so as to form a leading line to be followed. (Adapted from IHO Dictionary – S-32).

#### 5) Aero light

IHO Definition: An aero light is established for aeronautical navigation and may be of higher power than marine lights and visible from well offshore. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.48, November 2000).

#### 6) Air obstruction light

IHO Definition: A light marking an obstacle which constitutes a danger to air navigation. (IHO Dictionary – S-32, Edition 5; 2767).

#### 7) Fog detector light

IHO Definition: A light used to automatically determine conditions of visibility which warrant the turning on or off of a sound signal. (IHO Dictionary – S-32).

#### 8) Flood light

IHO Definition: A broad beam light used to illuminate a structure or area. (Adapted from The Collins Dictionary)

#### 9) Strip light

IHO Definition: A light whose source has a linear form generally horizontal, which can reach a length of several metres. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.48, November 2000).

#### 10) Subsidiary light

IHO Definition: A light placed on or near the support of a main light and having a special use in navigation. (Admiralty List of Radio Signals, UK Hydrographic Office).

#### 11) Spotlight

IHO Definition: A powerful light focused so as to illuminate a small area. (The Collins Dictionary).

#### 12) Front

IHO Definition: Term used with leading lights to describe the position of the light on the lead as viewed from seaward. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.49, November 2000).

#### 13) Rear

IHO Definition: Term used with leading lights to describe the position of the light on the lead as viewed from seaward. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.49, November 2000).

#### 14) Lower

IHO Definition: Term used with leading lights to describe the position of the light on the lead as viewed from seaward. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.49, November 2000).

#### 15) Upper

IHO Definition: Term used with leading lights to describe the position of the light on the lead as viewed from seaward. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.49, November 2000).

#### 16) Moiré effect

IHO Definition: A short range (up to 2km) type of directional light. Sodium lighting gives a yellow background screen on which a vertical black line will be seen by an observer on the centre line. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.49, November 2000).



**17) Emergency**

IHO Definition: A light available as a backup to a main light which will be illuminated should the main light fail. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.49, November 2000).

**18) Bearing light**

IHO Definition: A light which enables its approximate bearing to be obtained without the use of a compass. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.49, November 2000).

**19) Horizontally disposed**

IHO Definition: A group of lights of identical character and almost identical position, that are disposed horizontally. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.49, November 2000).

**20) Vertically disposed**

IHO Definition: A group of lights of identical character and almost identical position, that are disposed vertically. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.49, November 2000).

Remarks:

- Marine light (a light intended primarily for marine navigation) is not included in the above list. All lights considered to be marine lights unless the attribute “category of light” indicates otherwise.

**22.36 Category of marine farm/culture (CATMFA)****Category of marine farm/culture:** IHO Definition:**1) Crustaceans**

IHO Definition: Hard shelled animals, for example crabs or lobsters. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.50, November 2000).

**2) Edible bivalve molluscs**

IHO Definition: Oysters, mussels, scallops ... (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.50, November 2000, as amended).

**Comment [j155]:** MD8 – 5.Co.2.

**3) Fish**

IHO Definition: Vertebrate cold blooded animal with gills, living in water. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.50, November 2000).

**4) Seaweed**

IHO Definition: The general name for marine plants of the Algae class which grow in long narrow ribbons. (International Maritime Dictionary, 2nd Ed.).

**5) Pearl culture farm**

IHO Definition: An area where pearls are artificially cultivated. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.50, November 2000).

**22.37 Category of military practice area (CATMPA)****Category of military practice area:** IHO Definition:**2) Torpedo exercise area**

IHO Definition: An area within which exercises are carried out with torpedoes. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.52, November 2000).

**3) Submarine exercise area**

IHO Definition: An area within which submarine exercises are carried out. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.52, November 2000).

**4) Firing danger area**

IHO Definition: Areas for bombing and missile exercises (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.52, November 2000).

2.52, November 2000).

5) **Mine-laying practice area**

IHO Definition: An area within which mine laying exercises are carried out. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.52, November 2000).

6) **Small arms firing range**

IHO Definition: An area for shooting pistols, rifles and machine guns etc. at a target. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.52, November 2000).

## 22.38 Category of mooring/warping facility (CATMOR)

**Category of mooring/warping facility:** IHO Definition:

1) **Dolphin**

IHO Definition: A post or group of posts, which may support a deck, used for mooring or warping a vessel. (Adapted from IHO Dictionary – S-32).

2) **Deviation dolphin**

IHO Definition: A post or group of posts, which a vessel may swing around for compass adjustment. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

3) **Bollard**

IHO Definition: Small shaped post, mounted on a wharf or dolphin used to secure ship's lines. (IHO Dictionary – S-32).

4) **Tie-up wall**

IHO Definition: A section of wall designated for tying-up vessels awaiting transit. Bollards and mooring devices are available for both large and small ships. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

5) **Post or pile**

IHO Definition: A long heavy timber or section of steel, wood, concrete, etc., forced into the seabed to serve as a mooring facility. (Adapted from IHO Dictionary – S-32).

6) **Chain/wire/cable**

IHO Definition: A chain or very strong fibre or wire rope connecting two independent objects (e.g. a buoy and pile or two buoys) used to anchor or moor vessels or buoys. (Adapted from IHO Dictionary – S-32).

7) **Mooring buoy**

IHO Definition: A buoy secured to the bottom by permanent moorings with means for mooring a vessel by use of its anchor chain or mooring lines. (IHO Dictionary – S-32).

## 22.39 Category of navigation line (CATNAV)

**Category of navigation line:** IHO Definition:

1) **Clearing line**

IHO Definition: A straight line that marks the boundary between a safe and a dangerous area or that passes close to a navigational danger. (Adapted from IHO Dictionary, S-32).

2) **Transit line**

IHO Definition: A line passing through one or more fixed marks. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.55, November 2000).

3) **Leading line bearing a recommended track**

IHO Definition: A line passing through one or more clearly defined objects, along the path of which a vessel

approach safely up to a certain distance off. (Adapted from IHO Dictionary, S-32).

## 22.40 Category of obstruction (CATOBS)

**Category of obstruction:** IHO Definition:

### 1) Snag/stump

IHO Definition: A tree, branch or broken pile embedded in the ocean floor, river or lake bottom and not visible on the surface, forming thereby a hazard to vessels. (IHO Dictionary – S-32).

### 2) Wellhead

IHO Definition: A submarine structure projecting some distance above the seabed and capping a temporarily abandoned or suspended oil or gas well. (IHO Dictionary – S-32).

### 3) Diffuser

IHO Definition: A structure on an outfall through which liquids are discharged. The structure will usually project above the level of the outfall and can be an obstruction to navigation. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.56, November 2000).

### 4) Crib

IHO Definition: A permanent structure set in the water, framed with wooden beams and filled with rocks or boulders. They are used to anchor log booms or support other constructions, e.g. submerged outfalls, diffusers etc. They may always be dry, submerged or cover and uncover. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.56, November 2000).

### 5) Fish haven

IHO Definition: Areas established by private interests, usually sport fishermen, to simulate natural reefs and wrecks that attract fish. The reefs are constructed by dumping assorted junk in areas which may be of very small extent or may stretch a considerable distance along a depth contour. Also called fishery reefs. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.56, November 2000).

### 6) Foul area

IHO Definition: An area of numerous unidentified dangers to navigation. The area serves as a warning to the mariner that all dangers are not identified individually and that navigation through the area may be hazardous. Commonly used to encode areas behind danger lines on navigation charts. (Adapted from IHO Dictionary – S-32).

### ~~7) Foul ground~~

~~IHO Definition: Areas over which it is safe to navigate but which should be avoided for anchoring, taking the ground or ground fishing. (IHO Dictionary – S-32).~~

### 8) Ice boom

IHO Definition: Floating barriers, anchored to the bottom, used to deflect the path of floating ice in order to prevent the obstruction of locks, intakes, etc., and to prevent damage to bridge piers and other structures. (Canadian Hydrographic Service, Chart specifications).

### 9) Ground tackle

IHO Definition: Equipment such as anchors, concrete blocks, chains and cables, etc., used to position floating structures such as trot and mooring buoys etc. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.57, November 2000).

### 10) Boom

IHO Definition: A floating barrier used to protect a river or harbour mouth or to create a sheltered area for storage purposes. (IHO Dictionary – S-32).

## 22.41 Category of offshore platform (CATOFP)

**Category of offshore platform:** IHO Definition:

1) **Oil derrick/rig**

IHO Definition: A temporary mobile structure, either fixed or floating, used in the exploration stages of oil and gas fields. (IHO Dictionary – S-32).

2) **Production platform**

IHO Definition: A term used to indicate a permanent offshore structure equipped to control the flow of oil or gas. It does not include entirely submarine structures. (Adapted from IHO Dictionary – S-32).

3) **Observation/research platform**

IHO Definition: A platform from which one's surroundings or events can be observed, noted or recorded such as for scientific study. (Adapted from IHO Dictionary – S-32, Edition 5).

4) **Articulated loading platform (ALP)**

IHO Definition: A metal lattice tower, buoyant at one end and attached at the other by a universal joint to a concrete filled base on the seabed. The platform may be fitted with a helicopter platform, emergency accommodation and hawser/hose retrieval. (Adapted from United Kingdom Hydrographic Office CSDO 607.2 (12), May 1994).

5) **Single anchor leg mooring (SALM)**

IHO Definition: A rigid frame or tube with a buoyancy device at its upper end, secured at its lower end to a universal joint on a large steel or concrete base resting on the seabed, and at its upper end to a mooring buoy by a chain or wire. (Adapted from United Kingdom Hydrographic Office CSDO 607.2 (12), May 1994).

6) **Mooring tower**

IHO Definition: A platform secured to the seabed and surmounted by a turntable to which ships moor. (Adapted from United Kingdom Hydrographic Office CSDO 607.2 (12), May 1994).

7) **Artificial island**

IHO Definition: A man-made structure usually built for the exploration or exploitation of marine resources, marine scientific research, tidal observations, etc. (Adapted from IHO Dictionary – S-32).

8) **Floating production, storage and off-loading vessel (FPSO)**

IHO Definition: An offshore facility consisting of a moored tanker/barge by which the product is extracted, stored or exported. (Adapted from United Kingdom Hydrographic Office CSDO 607.2 (13), May 1994).

Comment [j156]: MD8 – 7.Cl.6 and 7.Co.18.

9) **Accommodation platform**

IHO Definition: A platform used primarily for eating, sleeping and recreation purposes. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.59, November 2000).

10) **Navigation, communication and control buoy (NCCB)**

IHO Definition: A floating structure with control room, power and storage facilities, attached to the seabed by a flexible pipeline and cables. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.59, November 2000).

## 22.42 Category of oil barrier (CATOLB)

**Category of oil barrier:** IHO Definition:

1) **Oil retention (high pressure pipe)**

IHO Definition: A pipe with holes from which air blows. When the air bubbles reach the surface they form a barrier which prevents the spread of oil. (Kort- og Matrikelstyrelsen, Denmark).

2) **Floating oil barrier**

IHO Definition: A floating tube shaped structure, with a curtain (2 metre) hanging under it, below the surface, which prevents the spread of oil. (Kort- og Matrikelstyrelsen, Denmark).

### 22.43 Category of pile (CATPLE)

#### Category of pile: IHO Definition:

##### 1) Stake

IHO Definition: An elongated wood or metal pole embedded in the seabed to serve as a marker or support. (Adapted from IHO Dictionary – S-32).

##### 3) Post

IHO Definition: A vertical piece of timber, metal or concrete forced into the earth or seabed. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

##### 4) Tripodal

IHO Definition: A single structure comprising 3 or more piles held together (sections of heavy timber, steel or concrete), and forced into the earth or seabed. (Adapted from IHO Dictionary – S-32).

##### 5) Piling

IHO Definition: A number of piles, usually in a straight line, and usually connected or bolted together (Adapted from IHO Dictionary – S-32).

##### 6) Row of piles

IHO Definition: A number of piles, usually in a straight line, but not connected by structural members (Australian Hydrographic Service).

Comment [j157]: S-57 –  
Extension 06/01.

### 22.44 Category of pilot boarding place (CATPIL)

#### Category of pilot boarding place: IHO Definition:

##### 1) Boarding by pilot-cruising vessel

IHO Definition: Pilot boards from a cruising vessel. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.62, November 2000).

##### 2) Boarding by helicopter

IHO Definition: Pilot boards by helicopter which comes out from the shore. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.62, November 2000).

##### 3) Pilot comes out from shore

IHO Definition: Pilot boards from a vessel which comes out from the shore on request. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.62, November 2000).

### 22.45 Category of pipeline/pipe (CATPIP)

#### Category of pipeline/pipe: IHO Definition:

##### 2) Outfall pipe

IHO Definition: A pipe (generally a sewer or drainage pipe) discharging in to the sea or a river. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

##### 3) Intake pipe

IHO Definition: A pipe taking water from a river or other body of water, to drive a mill or supply a canal, waterworks, etc. (Adapted from IHO Dictionary – S-32).

##### 4) Sewer

IHO Definition: A pipe in a sewage system for carrying water or sewage to a disposal area. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

##### 5) Bubbler system

**IHO Definition:** A submerged pipe from which warm water bubbles, preventing the surrounding water from freezing. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.63, November 2000).

6) **Supply pipe**

**IHO Definition:** A pipe used for transport (supply) of gas or liquid product. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

## 22.46 Category of production area (CATPRA)

**Category of production area:** IHO Definition:

1) **Quarry**

**IHO Definition:** An open-air excavation for the extraction of stone intended principally for use in construction. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

2) **Mine**

**IHO Definition:** An excavation made in the terrain for the purpose of extracting and/or exploiting natural resources. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

3) **Stockpile**

**IHO Definition:** A reserve stock of material, equipment or other supplies. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.64, November 2000).

4) **Power station area**

**IHO Definition:** A facility including one or more buildings and equipment used for power generation. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

5) **Refinery area**

**IHO Definition:** A facility where petroleum and/or petroleum products are refined. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

6) **Timber yard**

**IHO Definition:** An open tract for the storage of wooden lumber and timbers. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

7) **Factory area**

**IHO Definition:** A group of buildings where goods are manufactured. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.64, November 2000).

8) **Tank farm**

**IHO Definition:** A tract of land occupied by large-capacity tanks in which petroleum, natural gas, or liquid petrochemicals are stored. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

9) **Wind farm**

**IHO Definition:** A collection of wind motors that are collocated and are organized as a single power generation unit. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

10) **Slag heap/spoil heap**

**IHO Definition:** Hill of refuse from a mine, industrial plant etc. on land. (Adapted from Concise Oxford Dictionary).

## 22.47 Category of pylon (CATPYL)

**Category of pylon:** IHO Definition:

1) **Power transmission pylon/pole**

**IHO Definition:** A pylon that supports one or more power lines. (Defence Geospatial Information Working

Group; Feature Data Dictionary Register, 2010).

2) **Telephone/telegraph pylon/pole**

IHO Definition: A pylon that supports one or more communication lines. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

3) **Aerial cableway/sky pylon**

IHO Definition: A tower or pylon supporting steel cables which convey cars, buckets, or other suspended carrier units. (Adapted from Defence Geospatial Information Working Group; Feature and Attribute Coding Catalogue, Edition 1.2).

4) **Bridge pylon/tower**

IHO Definition: A tower and/or pylon from which the deck of a bridge is suspended. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

5) **Bridge pier**

IHO Definition: A pillar or abutment that supports a bridge span. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

## 22.48 Category of radar station (CATRAS)

**Category of radar station:** IHO Definition:

1) **Radar surveillance station**

IHO Definition: A radar station established for traffic surveillance. (IHO Dictionary – S-32)

2) **Coast radar station**

IHO Definition: A shore-based station which the mariner can contact by radio to obtain a position. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.68, November 2000).

## 22.49 Category of radar transponder beacon (CATRTB)

**Category of radar transponder beacon:** IHO Definition:

1) **Ramark, radar beacon transmitting continuously**

IHO Definition: A radar marker beacon which continuously transmits a signal appearing as a radial line on a radar screen, the line indicating the direction of the beacon. Remarks are intended primarily for marine use. The name "ramark" is derived from the words radar marker. (IHO Dictionary – S-32).

2) **Racon, radar transponder beacon**

IHO Definition: A radar beacon which returns a coded signal which provides identification of the beacon, as well as range and bearing. The range and bearing are indicated by the location of the first character received on the radar screen. The name "racon" is derived from the words radar beacon. (IHO Dictionary – S-32).

3) **Leading racon/radar transponder beacon**

IHO Definition: A radar beacon that may be used (in conjunction with at least one other radar beacon) to indicate a leading line. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.69, November 2000).

## 22.50 Category of radio station (CATROS)

**Category of radio station:** IHO Definition:

A radiobeacon is a radio transmitter which emits a distinctive or characteristic signal on which a bearing may be taken. (Adapted from IHO Dictionary, S-32).

1) **Circular (non-directional) marine or aero-marine radiobeacon**

IHO Definition: A radio station which need not necessarily be manned, the emissions of which, radiated

around the horizon, enable its bearing to be determined by means of the radio direction finder of a ship. (IHO Dictionary – S-32).

2) **Directional radiobeacon**

IHO Definition: A special type of radiobeacon station the emissions of which are intended to provide a definite track for guidance. (IHO Dictionary – S-32).

3) **Rotating-pattern radiobeacon**

IHO Definition: A special type of radiobeacon station emitting a beam of waves to which a uniform turning movement is given, the bearing of the station being determined by means of an ordinary listening receiver and a stop watch. Also referred to as a rotating loop radiobeacon. (IHO Dictionary – S-32).

4) **Consol beacon**

IHO Definition: A type of long range position fixing beacon. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.70, November 2000).

5) **Radio direction-finding station**

IHO Definition: A radio station intended to determine only the direction of other stations by means of transmission from the latter. (IHO Dictionary – S-32).

6) **Coast radio station providing QTG service**

IHO Definition: A radio station which is prepared to provide QTG service, that is to say, to transmit upon request from a ship, a radio signal, the bearing of which can be taken by that ship. (IHO Dictionary – S-32).

7) **Aeronautical radiobeacon**

IHO Definition: A radio beacon designed for aeronautical use. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.71, November 2000).

8) **Decca**

IHO Definition: The Decca Navigator System is a high accuracy, short to medium range radio navigational aid intended for coastal and landfall navigation. (Admiralty List of Radio Signals, UK Hydrographic Office, Volume 2, 1994).

9) **Loran C**

IHO Definition: A low frequency electronic position fixing system using pulsed transmissions at 100 Khz. (Admiralty List of Radio Signals, UK Hydrographic Office, Volume 2, 1994).

10) **Differential GNSS**

IHO Definition: A radiobeacon transmitting DGPS correction signals. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.71, November 2000).

11) **Toran**

IHO Definition: An electronic position fixing system used mainly by aircraft. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.71, November 2000).

12) **Omega**

IHO Definition: A long-range radio navigational aid which operates within the VLF frequency band. The system comprises eight land based stations. (Admiralty List of Radio Signals, UK Hydrographic Office, Volume 2, 1994).

13) **Syledis**

IHO Definition: A ranging position fixing system operating at 420-450MHz over a range of up to 400Km. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.71, November 2000).

14) **Chaika (Chayka)**

IHO Definition: A low frequency electronic position fixing system using pulsed transmissions at 100 Khz. (Admiralty List of Radio Signals, UK Hydrographic Office, Volume 2, 1995).

15) **Radio telephone station**

IHO Definition: The equipment needed at one station to carry on two way voice communication by radio



waves only. (Websters New World Dictionary Third College Edition).

**Comment [j158]:** S-57  
Extension 06/01.

## 22.51 Category of recommended track (CATTRK)

**Category of recommended track:** IHO Definition:

### 1) Based on a system of fixed marks

IHO Definition: A straight route (known as a recommended track, range or leading line), which comprises:

- a. at least two structures (usually beacons or daymarks) and/or natural features, which may carry lights and/or top-marks. The structures/features are positioned so that when observed to be in line, a vessel can follow a known bearing with safety. (adapted from International Association of Lighthouse Authorities - IALA Aids to Navigation Guide, 1990); or
- b. a single structure or natural feature, which may carry lights and/or a topmark, and a specified bearing which can be followed with safety. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.72, November 2000, as amended).

**Comment [j159]:** MD8 –  
2.Co.5 and 2.Cl.6

### 2) Not based on a system of fixed marks

IHO Definition: A route (known as a recommended track or preferred route) which is not based on a single or series of structures or features in line. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.72, November 2000).

## 22.52 Category of rescue station (CATRSC)

**Category of rescue station:** IHO Definition:

### 1) Rescue station with lifeboat

IHO Definition: A place where equipment for saving life at sea is maintained; the type of lifeboat may vary from fast, long distance boats to inflatable inshore boats. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.74, November 2000).

### 2) Rescue station with rocket

IHO Definition: Rocket - a pyrotechnic projectile used for signalling or for life-saving purposes. (IHO Dictionary – S-32).

### 4) Refuge for shipwrecked mariners

IHO Definition: Shelter or protection from danger or distress at sea. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.74, November 2000).

### 5) Refuge for intertidal area walkers

IHO Definition: Shelter or protection from danger in areas exposed to extreme and sudden tides or tidal streams. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.74, November 2000).

### 6) Lifeboat lying at a mooring

IHO Definition: A place where a lifeboat is moored ready for use. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.74, November 2000).

### 7) Aid radio station

IHO Definition: A radio station reserved for emergency situations, might also be a public telephone. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.74, November 2000).

### 8) First aid equipment

IHO Definition: A place where first aid equipment is available. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.74, November 2000).

## 22.53 Category of restricted area (CATREA)

### Category of restricted area: IHO Definition:

#### 1) Offshore safety zone

IHO Definition: The area around an offshore installation within which vessels are prohibited from entering without permission. Special regulations protect installations within a safety zone and vessels of all nationalities are required to respect the zone. (IHO Dictionary – S-32, Edition 5).

#### 4) Nature reserve

IHO Definition: A tract of land or water managed so as to preserve its flora, fauna, physical features, etc. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.75, November 2000, as amended).

Comment [j160]: MD8 – 2.Co.3 and 2.Cl.5

#### 5) Bird sanctuary

IHO Definition: A place where birds are bred and protected. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.75, November 2000).

#### 6) Game reserve

IHO Definition: A place where wild animals or birds hunted for sport or food are kept undisturbed for private use. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.75, November 2000).

#### 7) Seal sanctuary

IHO Definition: A place where seals are protected. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.75, November 2000).

#### 8) Degaussing range

IHO Definition: An area, usually about two cables diameter, within which ships' magnetic fields may be measured; sensing instruments and cables are installed on the seabed in the range and there are cables leading from the range to a control position ashore. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.76, November 2000).

#### 9) Military area

IHO Definition: An area controlled by the military in which restrictions may apply. (Hydrographic Service, Royal Australian Navy).

#### 10) Historic wreck area

IHO Definition: An area around certain wrecks of historical importance to protect the wrecks from unauthorized interference by diving, salvage or deposition (including anchoring). (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.76, November 2000).

#### 12) Navigational aid safety zone

IHO Definition: An area around a navigational aid which vessels are prohibited from entering. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.76, November 2000).

#### 14) Minefield

IHO Definition: An area laid and maintained with explosive mines for defence or practice purposes. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.76, November 2000).

#### 18) Swimming area

IHO Definition: An area in which people may swim and therefore vessel movement may be restricted. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.76, November 2000).

#### 19) Waiting area

IHO Definition: An area reserved for vessels waiting to enter a harbour. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.76, November 2000).

#### 20) Research area

IHO Definition: An area where marine research takes place. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.76, November 2000).

**21) Dredging area**

IHO Definition: An area where dredging is taking place. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.76, November 2000).

**22) Fish sanctuary**

IHO Definition: A place where fish [including shellfish and crustaceans] are protected. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.76, November 2000, as amended).

**Comment [j161]:** MD8 – 5.Co.4.

**23) Ecological reserve**

IHO Definition: A tract of land [or water] managed so as to preserve the relation of plants and living creatures to each other and to their surroundings. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.76, November 2000, as amended).

**Comment [j162]:** MD8 – 2.Co.3 and 2.Cl.5

**24) No wake area**

IHO Definition: An area in which a vessels' speed must be reduced in order to reduce the size of the wake it produces. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.76, November 2000).

**25) Swinging area**

IHO Definition: An area where vessels turn. (Service Hydrographique et Océanographique de la Marine, France).

**26) Water skiing area**

IHO Definition: An area within which people may water ski and therefore vessel movement may be restricted. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.76, November 2000).

**27) Environmentally sensitive sea area**

IHO Definition: A generic term which may be used to describe a wide range of areas, considered sensitive for a variety of environmental reasons. (IHO Chart Specifications, S-4).

**28) Particularly sensitive sea area**

IHO Definition: An area that needs special protection through action by IMO because of its significance for regional ecological, socio-economic or scientific reasons and because it may be vulnerable to damage by international shipping activities. (IHO Chart Specifications, S-4).

**29) Disengagement area**

IHO Definition: An area near a fairway where vessels can go to clear the way or make an about turn and possibly return to a waiting area when the nautical conditions impose it.

**Remarks:**

- The official legal status of each kind of restricted area defines the kind of restriction(s), e.g. the restriction for a "game preserve" may be "entering prohibited", the restriction for an "anchoring prohibition area" is "anchoring prohibited".

**22.54 Category of road (CATROD)****Category of road:** IHO Definition:**1) Motorway**

IHO Definition: A limited access dual carriageway road specially designed for fast long-distance traffic and subject to special regulations concerning its use. It may have more than two lanes. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

**2) Major road**

IHO Definition: A hard surfaced (metalled) road; a main through route. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.77, November 2000).

**3) Minor road**

IHO Definition: A secondary road for local traffic. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.77, November 2000).

**4) Track/path**

IHO Definition: Track - a rough path or way formed by use. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

Path - a way or track laid down for walking or made by continual treading. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

**5) Major street**

IHO Definition: A main road, in an urban area, for through traffic. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.77, November 2000).

**6) Minor street**

IHO Definition: A secondary road, in an urban area, for local traffic. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.77, November 2000).

**22.55 Category of runway (CATRUN)**

**Category of runway:** IHO Definition:

**1) Aeroplane runway**

IHO Definition: A defined rectangular area, on a land aerodrome, prepared for the landing and take-off run of aircraft along its length. (IHO Dictionary – S-32).

**2) Helicopter landing pad**

IHO Definition: A site on which helicopters may land and take off. (IHO Dictionary – S-32).

**22.56 Category of sea area (CATSEA)**

**Category of sea area:** IHO Definition:

**2) Gat**

IHO Definition: A natural or artificial passage or channel through shoals or steep banks, or across a line of banks lying between two channels. (IHO Dictionary – S-32).

**3) Bank**

IHO Definition: An elevation over which the depth of water is relatively shallow, but normally sufficient for safe surface navigation. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

**4) Deep**

IHO Definition: In oceanography, an obsolete term which was generally restricted to depths greater than 6,000 m. (IHO Dictionary – S-32).

**5) Bay**

IHO Definition: Wide indentation in the coastline generally smaller than a gulf and larger than a cove. (IHO Dictionary – S-32).

**6) Trench**

IHO Definition: A long narrow, characteristically very deep and asymmetrical depression of the sea floor, with relatively steep sides. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

**7) Basin**

IHO Definition: A depression, characteristically in the deep sea floor, more or less equidimensional in plan and of variable extent. (adapted from IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

**8) Mud flats**

IHO Definition: A level tract of land, as the bed of a dry lake or an area frequently uncovered at low tide.

Usually in plural. (IHO Dictionary – S-32).

9) **Reef**

IHO Definition: Rock lying at or near the sea surface that may constitute a hazard to surface navigation. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

10) **Ledge**

IHO Definition: A rocky formation continuous with and fringing the shore. (IHO Dictionary – S-32).

11) **Canyon**

IHO Definition: A relatively narrow, deep depression with steep sides, the bottom of which generally has a continuous slope, developed characteristically on some continental slopes. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

12) **Narrows**

IHO Definition: A navigable narrow part of a bay, strait, river, etc. (IHO Dictionary – S-32).

13) **Shoal**

IHO Definition: An offshore hazard to surface navigation that is composed of unconsolidated material. (Adapted from IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

14) **Knoll**

IHO Definition: A relatively small isolated elevation of a rounded shape. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

15) **Ridge**

IHO Definition: (a) A long, narrow elevation with steep sides. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

(b) A long, narrow elevation often separating ocean basins. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

(c) The linked major mid-oceanic mountain systems of global extent. Also called mid-oceanic ridge. (adapted from IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

16) **Seamount**

IHO Definition: A large isolated elevation, greater than 1000m in relief above the sea floor, characteristically of conical form. (Adapted from IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

17) **Pinnacle**

IHO Definition: Any high tower or spire-shaped pillar or rock or coral, alone or cresting a summit. It may extend above the surface of the water. It may or may not be a hazard to surface navigation. (IHO Dictionary – S-32).

18) **Abyssal plain**

IHO Definition: An extensive, flat, gently sloping or nearly level region at abyssal depths. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

19) **Plateau**

IHO Definition: A flat or nearly flat area of considerable extent, dropping off abruptly on one or more sides. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

20) **Spur**

IHO Definition: A subordinate elevation, ridge or rise projecting outward from a larger feature. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

21) **Shelf**

IHO Definition: A zone adjacent to a continent (or around an island) and extending from the low water line to a depth at which there is usually a marked increase of slope towards oceanic depths. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

**22) Trough**

IHO Definition: A long depression of the sea floor characteristically flat bottomed and steep sided and normally shallower than a trench. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

**23) Saddle**

IHO Definition: A broad pass, resembling in shape a riding saddle, in a ridge or between contiguous seamounts. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

**24) Abyssal hills**

IHO Definition: A tract, on occasion extensive, of low (100-500m) elevations on the deep sea floor. (Adapted from IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

**25) Apron**

IHO Definition: A gently dipping featureless surface, underlain primarily by sediment, at the base of any steeper slope. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

**26) Archipelagic apron**

IHO Definition: A gentle slope with a generally smooth surface on the sea floor, characteristically found around groups of islands or seamounts. (Adapted from IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

**27) Borderland**

IHO Definition: A region adjacent to a continent, normally occupied by or bordering a shelf, that is highly irregular with depths well in excess of those typical of a shelf. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

**28) Continental margin**

IHO Definition: The zone, generally consisting of shelf, slope and rise, separating the continent from the abyssal plain or deep sea floor. (Adapted from IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

**29) Continental rise**

IHO Definition: A gentle slope rising from the oceanic depths towards the foot of a continental slope. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

**30) Escarpment**

IHO Definition: An elongated and comparatively steep slope separating or gently sloping areas. Also called: scarp. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

**31) Fan**

IHO Definition: A relatively smooth, fan-like, depositional feature normally sloping away from the outer termination of a canyon or canyon system. Also called: cone. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

**32) Fracture zone**

IHO Definition: An extensive linear zone of irregular topography of the sea floor, characterized by steep-sided or asymmetrical ridges, troughs or escarpments. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

**33) Gap**

IHO Definition: A narrow break in a ridge or a rise. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

**34) Guyot**

IHO Definition: A seamount having a comparatively smooth flat top. Also called tablemount. (IHO Dictionary – S-32 and IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

**35) Hill**

IHO Definition: A small isolated elevation (see also abyssal hills). (IHO-IOC Publication B-6, Standardization

of Undersea Feature Names, 2nd Edition).

36) **Hole**

IHO Definition: A local depression, often steep sided, of the sea floor. (Adapted from IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

37) **Levee**

IHO Definition: A depositional embankment bordering a canyon, valley or deep-sea channel. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

38) **Median valley**

IHO Definition: The axial depression of the mid-oceanic ridge system. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

39) **Moat**

IHO Definition: An annular depression that may not be continuous, located at the base of many seamounts, islands and other isolated elevations. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

40) **Mountains**

IHO Definition: A large and complex grouping of ridges and seamounts. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

41) **Peak**

IHO Definition: A prominent elevation either pointed or of a very limited extent across the summit. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

42) **Province**

IHO Definition: A region identifiable by a group of similar physiographic features whose characteristics are markedly in contrast with surrounding areas. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

43) **Rise**

IHO Definition: (a) A broad elevation that rises gently and generally smoothly from the sea floor.

(b) The linked major mid-oceanic mountain systems of global extent. Also called mid-oceanic ridge. (Adapted from IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

44) **Sea channel**

IHO Definition: A continuously sloping, elongated narrow depression commonly found in fans or abyssal plains and customarily bordered by levees on one or both sides. (Adapted from IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

45) **Seamount chain**

IHO Definition: Several seamounts in linear or arcuate alignment. Also called: seamounts. (Adapted from IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

46) **Shelf-edge**

IHO Definition: A narrow zone at the seaward margin of a shelf along which is a marked increase of slope. Also called: shelf break. (Adapted from IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

47) **Sill**

IHO Definition: A sea floor barrier of relatively shallow depth restricting water movement between basins. (Adapted from IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

48) **Slope**

IHO Definition: The slope seaward from the shelf edge to the upper edge of a continental rise or the point where there is a general reduction in slope. (Adapted from IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

**49) Terrace**

IHO Definition: A relatively flat horizontal or gently inclined surface, sometimes long and narrow, which is bounded by a steeper ascending slope on one side and by a steeper descending slope on the opposite side. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

**50) Valley**

IHO Definition: A relatively shallow, wide depression, the bottom of which usually has a continuous gradient. This term is generally not used for features that have canyon-like characteristics for a significant portion of their extent. Also called: submarine valley; sea valley. (IHO-IOC Publication B-6, Standardization of Undersea Feature Names, 2nd Edition).

**51) Canal**

IHO Definition: An artificial water course. (IHO Dictionary – S-32).

**52) Lake**

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

**53) River**

IHO Definition: A relatively large natural stream of water. (IHO Dictionary – S-32).

**54) Reach**

IHO Definition: A straight section of a river, especially a navigable river between two bends or an arm of the sea extending into the land. (Adapted from IHO Dictionary – S-32).

**22.57 Category of shoreline construction (CATSLC)**

**Category of shoreline construction:** IHO Definition:

**1) Breakwater**

IHO Definition: A structure protecting a shore area, harbour, anchorage, or basin from waves. (IHO Dictionary – S-32).

**2) Groyne (groin)**

IHO Definition: A low artificial wall-like structure of durable material extending from the land to seaward for a particular purpose, such as to prevent coast erosion. (Adapted from IHO Dictionary – S-32 and IHO Chart Specifications, S-4).

**3) Mole**

IHO Definition: A form of breakwater alongside which vessels may lie on the sheltered side only; in some cases it may lie entirely within an artificial harbour, permitting vessels to lie along both sides. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.84, November 2000).

**4) Pier (jetty)**

IHO Definition: A long, narrow structure extending into the water to afford a berthing place for vessels, to serve as a promenade, etc. (IHO Dictionary – S-32).

**5) Promenade pier**

IHO Definition: A pier built only for recreational purposes. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.84, November 2000).

**6) Wharf (quay)**

IHO Definition: A structure serving as a berthing place for vessels. (IHO Dictionary – S-32).

**7) Training wall**

IHO Definition: A wall or bank, often submerged, built to direct or confine the flow of a river or tidal current, or to promote a scour action. (Adapted from IHO Dictionary – S-32 and IHO Chart Specifications, S-4).

**8) Rip rap**

IHO Definition: A layer of broken rock, cobbles, boulders, or fragments of sufficient size to resist the erosive



forces of flowing water and wave action. (Adapted from Marine Chart Manual, US National Oceanic and Atmospheric Administration - NOAA, 1992).

9) **Revetment**

IHO Definition: Facing of stone or other material, either permanent or temporary, placed along the edge of a stream, river or canal to stabilize the bank and to protect it from the erosive action of the stream. (Adapted from IHO Dictionary – S-32).

10) **Sea wall**

IHO Definition: An embankment or wall for protection against waves or tidal action along a shore or water front. (IHO Dictionary – S-32).

11) **Landing steps**

IHO Definition: Steps at the shoreline as the connection between land and water on different levels. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

12) **Ramp**

IHO Definition: A sloping structure that can either be used, as a landing place, at variable water levels, for small vessels, landing ships, or a ferry boat, or for hauling a cradle carrying a vessel, which may include rails. (Adapted from IHO Dictionary – S-32).

13) **Slipway**

IHO Definition: The prepared and usually reinforced inclined surface on which keel- and bilge-blocks are laid for supporting a vessel under construction. (IHO Dictionary – S-32).

14) **Fender**

IHO Definition: A protective structure designed to cushion the impact of a vessel and prevent damage. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

15) **Solid face wharf**

IHO Definition: A wharf consisting of a solid wall of concrete, masonry, wood etc., such that the water cannot circulate freely under the wharf. The type of construction affects ship-handling; for example, a solid face wharf may give shelter from tidal streams, but under certain circumstances a cushion of water may build up between such a wharf and a ship attempting to berth at it, causing difficulties in ship handling. (Capt. A. Rae, pilot, Port of Halifax & Mr. R. Morash, wharf building engineer, Transport Canada).

16) **Open face wharf**

IHO Definition: A wharf supported on piles or other structures which allow free circulation of water under the wharf. (Capt. A. Rae, pilot, Port of Halifax & Mr. R. Morash, wharf building engineer, Transport Canada).

17) **Log ramp**

IHO Definition: An inclined plane used to dump logs into the water for transport, or to haul logs out of the water for processing. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

18) **Swimming facility**

IHO Definition: An artificial pool or swimming enclosure, especially one in the open air, which may be constructed of wire mesh or heavy netting supported by cables, buoys or piles, for swimming in. (Adapted from the Macquarie Concise Dictionary).

Remarks:

- The attribute “category of shoreline construction” encodes the usage of a shoreline construction.

Comment [j163]: Extension 6/01.

## 22.58 Category of signal station, traffic (CATSIT)

**Category of signal station, traffic:** IHO Definition:

1) **Port control**

IHO Definition: A signal station for the control of vessels within a port. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.86, November 2000).

**2) Port entry and departure**

IHO Definition: A signal station for the control of vessels entering or leaving a port. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.86, November 2000).

**3) International port traffic**

IHO Definition: A signal station displaying International Port Traffic signals. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.86, November 2000).

**4) Berthing**

IHO Definition: A signal station for the control of vessels when berthing. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.86, November 2000).

**5) Dock**

IHO Definition: A signal station for the control of vessels entering or leaving a dock. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.86, November 2000).

**6) Lock**

IHO Definition: A signal station for the control of vessels entering or leaving a lock. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.86, November 2000).

**7) Flood barrage**

IHO Definition: A signal station for the control of vessels wishing to pass through a flood control barrage. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.86, November 2000).

**8) Bridge passage**

IHO Definition: A signal station for the control of vessels wishing to pass under a bridge. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.86, November 2000).

**9) Dredging**

IHO Definition: A signal station indicating when dredging is in progress. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.86, November 2000).

**10) Traffic control light**

IHO Definition: Visual signal lights placed in a waterway to indicate to shipping the movements authorised at the time at which they are shown. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.86, November 2000).

**22.59 Category of signal station, warning (CATSIW)**

**Category of signal station, warning:** IHO Definition:

**1) Danger**

IHO Definition: A signal or message warning of the presence of a danger to navigation. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.87, November 2000).

**2) Maritime obstruction**

IHO Definition: A signal or message warning of the presence of a maritime obstruction. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.87, November 2000).

**3) Cable**

IHO Definition: A signal or message warning of the presence of a cable. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.87, November 2000).

**4) Military practice**

IHO Definition: A signal or message warning of activity in a military practice area. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.87, November 2000).

**5) Distress**

IHO Definition: A station that may receive or transmit distress signals. (S-57 Edition 3.1, Appendix A –

Chapter 2, Page 2.87, November 2000).

6) **Weather**

IHO Definition: A visual signal displayed to indicate a weather forecast. (IHO Dictionary – S-32).

7) **Storm**

IHO Definition: A signal or message conveying information about storm conditions. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.87, November 2000).

8) **Ice**

IHO Definition: A signal or message conveying information about ice conditions. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.87, November 2000).

9) **Time**

IHO Definition: An accurate signal marking a specified time or time interval. It is used primarily for determining errors of timepieces. Such signals are usually sent from an observatory by radio or telegraph, but visual signals are used at some ports. (IHO Dictionary – S-32).

10) **Tide**

IHO Definition: A signal or message conveying information on tidal conditions in the area in question. (IHO Dictionary – S-32).

11) **Tide stream**

IHO Definition: A signal or message conveying information on condition of tidal currents in the area in question. (IHO Dictionary – S-32).

12) **Tide gauge**

IHO Definition: A device for measuring the height of tide. A graduated staff in a sheltered area where visual observations can be made; or it may consist of an elaborate recording instrument making a continuous graphic record of tide height against time. Such an instrument is usually actuated by a float in a pipe communicating with the sea through a small hole which filters out shorter waves. (IHO Dictionary – S-32).

13) **Tide scale**

IHO Definition: A visual scale which directly shows the height of the water above chart datum or a local datum. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.88, November 2000).

14) **Diving**

IHO Definition: A signal or message warning of diving activity. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.88, November 2000).

15) **Water level gauge**

IHO Definition: A device for measuring and conveying information about the water level (non-tidal) in the area in question. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.88, November 2000).

## 22.60 Category of silo/tank (CATSIL)

**Category of silo/tank:** IHO Definition:

1) **Silo in general**

IHO Definition: A large storage structure used for storing loose materials. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

2) **Tank in general**

IHO Definition: A fixed structure for storing liquids. (IHO Dictionary – S-32).

3) **Grain elevator**

IHO Definition: A storage building for grain. Usually a tall frame, metal or concrete structure with an especially compartmented interior. (The New Encyclopaedia Britannica Micropaedia, 15th Edition).

4) **Water tower**

IHO Definition: A tower supporting an elevated storage tank of water. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

**22.61 Category of slope (CATSLO)**

**Category of slope:** IHO Definition:

1) **Cutting**

IHO Definition: An excavation through high ground for a road, canal, etc. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.90, November 2000).

2) **Embankment**

IHO Definition: A man-made raised long mound of earth or other material. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

3) **Dune**

IHO Definition: A mound, ridge or hill of drifted material on the sea coast or in a desert. (Adapted from IHO Dictionary – S-32).

4) **Hill**

IHO Definition: A small isolated elevation, smaller than a mountain. (IHO Dictionary – S-32).

6) **Cliff**

IHO Definition: Land rising abruptly for a considerable distance above the water or surrounding land. (IHO Dictionary – S-32).

**Comment [j164]:** MD8 – 7.Co.22

7) **Scrie**

IHO Definition: A mass of detritus, forming a precipitous, strong slope upon a mountain-side. Also the material composing such a slope. (IHO Dictionary – S-32).

**22.62 Category of small craft facility (CATSCF)**

**Category of small craft facility:** IHO Definition:

1) **Visitor's berth**

IHO Definition: A berth set aside for the use of visiting vessels. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.91, November 2000).

2) **Nautical club**

IHO Definition: A club for mariners generally associated with other small craft facilities. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.91, November 2000).

3) **Boat hoist**

IHO Definition: A hoist for lifting boats out of the water [also known as a travel lift]. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.91, November 2000).

**Comment [j165]:** MD8 – 3.Cl.5 and 3.Co.4.

4) **Sailmaker**

IHO Definition: A place where sails are made or may be taken for repair. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.91, November 2000).

5) **Boatyard**

IHO Definition: A place on shore where boats may be built, stored and repaired. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

6) **Public inn**

IHO Definition: A public house providing food, drink and accommodation. (The Collins Reference English

Dictionary, 1992).

7) **Restaurant**

IHO Definition: A commercial establishment serving food. (The Collins Reference Dictionary, 1992).

8) **Chandler**

IHO Definition: A dealer in ships' supplies. (The Collins Reference Dictionary, 1992).

9) **Provisions**

IHO Definition: A place where food and other such supplies are available. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

10) **Doctor**

IHO Definition: A place where a doctor is available to provide medical attention. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

11) **Pharmacy**

IHO Definition: A place where medical drugs are dispensed. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

12) **Water tap**

IHO Definition: A place where fresh water is available. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

13) **Fuel station**

IHO Definition: A place where fuel is available. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

14) **Electricity**

IHO Definition: A place where a connection to an electrical supply is available. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

15) **Bottle gas**

IHO Definition: A place where bottled gas is available. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

16) **Showers**

IHO Definition: A place where showers are available. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

17) **Launderette**

IHO Definition: A place where there are facilities for washing clothes. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

18) **Public toilets**

IHO Definition: A place where toilets are available for public use. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

19) **Post box**

IHO Definition: A place where mail may be posted. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

20) **Public telephone**

IHO Definition: A place where a telephone is available for public use. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

21) **Refuse bin**

IHO Definition: A place where refuse may be dumped. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

22) **Car park**

**IHO Definition:** A place where cars may be parked. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

**23) Parking for boats and trailers**

**IHO Definition:** A place on shore where boats and/or trailers may be parked. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

**24) Caravan site**

**IHO Definition:** A place where caravans may be parked or where caravan accommodation is provided. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

**25) Camping site**

**IHO Definition:** A place where visitors may pitch tents and camp. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

**26) Sewerage pump-out station**

**IHO Definition:** A place where sewerage may be pumped off a vessel. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

**27) Emergency telephone**

**IHO Definition:** A place where a telephone is available for emergency use only. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

**28) Landing/launching place for boats**

**IHO Definition:** A place where boats may be landed or launched. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

**29) Visitors mooring**

**IHO Definition:** A mooring set aside for the use of visiting vessels. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

**30) Scrubbing berth**

**IHO Definition:** A place where vessels may berth for the purpose of careening. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

**31) Picnic area**

**IHO Definition:** A place where people may go to eat a picnic. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

**32) Mechanics workshop**

**IHO Definition:** A place where mechanical repairs can be undertaken to engines or other vessel equipment. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

**33) Guard and/or security service**

**IHO Definition:** A place where a vessel is patrolled by a security service or stored in a secure lockup. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.92, November 2000).

## 22.63 Category of special purpose mark (CATSPM)

**Category of special purpose mark:** **IHO Definition:**

**1) Firing danger mark**

**IHO Definition:** A mark used to indicate a firing danger area, usually at sea. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.94, November 2000).

**2) Target mark**

**IHO Definition:** Any object toward which something is directed the distinctive marking or instrumentation of a ground point to aid its identification on a photograph. (Adapted from IHO Dictionary – S-32).

- 3) **Marker ship mark**  
IHO Definition: A mark marking the position of a ship which is used as a target during some military exercise. (Bundesamt für Seeschifffahrt und Hydrographie, Germany).
- 4) **Degaussing range mark**  
IHO Definition: A mark used to indicate a degaussing range. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.94, November 2000).
- 5) **Barge mark**  
IHO Definition: A mark of relevance to barges. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.94, November 2000).
- 6) **Cable mark**  
IHO Definition: A mark used to indicate the position of submarine cables or the point at which they run on to the land. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.94, November 2000).
- 7) **Spoil ground mark**  
IHO Definition: A mark used to indicate the limit of a spoil ground. (Adapted from IHO Dictionary – S-32).
- 8) **Outfall mark**  
IHO Definition: A mark used to indicate the position of an outfall or the point at which it leaves the land. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.94, November 2000).
- 9) **ODAS**  
IHO Definition: Ocean Data Acquisition System. (IHO Dictionary – S-32).
- 10) **Recording mark**  
IHO Definition: A mark used to record data for scientific purposes. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.94, November 2000).
- 11) **Seaplane anchorage mark**  
IHO Definition: A mark used to indicate a seaplane anchorage. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.94, November 2000).
- 12) **Recreation zone mark**  
IHO Definition: A mark used to indicate a recreation zone. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.94, November 2000).
- 14) **Mooring mark**  
IHO Definition: A mark indicating a mooring or moorings. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.94, November 2000).
- 15) **LANBY (Large Automatic navigational Buoy)**  
IHO Definition: A large buoy designed to take the place of a lightship where construction of an offshore light station is not feasible. (IHO Dictionary – S-32).
- 16) **Leading mark**  
IHO Definition: Aids to navigation or other indicators so located as to indicate the path to be followed. Leading marks identify a leading line when they are in transit. (IHO Dictionary – S-32).
- 17) **Measured distance mark**  
IHO Definition: A mark forming part of a transit indicating one end of a measured distance. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.94, November 2000).
- 18) **Notice mark**  
IHO Definition: A notice board or sign indicating information to the mariner. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.94, November 2000).
- 19) **TSS Mark**  
IHO Definition: A mark indicating a Traffic Separation Scheme. (S-57 Edition 3.1, Appendix A – Chapter 2,

Page 2.94, November 2000).

**20) Anchoring prohibited mark**

IHO Definition: A mark indicating an anchoring prohibited area. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

**21) Berthing prohibited mark**

IHO Definition: A mark indicating that berthing is prohibited. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

**22) Overtaking prohibited mark**

IHO Definition: A mark indicating that overtaking is prohibited. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

**23) Two-way traffic prohibited mark**

IHO Definition: A mark indicating a one-way route. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

**24) “Reduced wake” mark**

IHO Definition: A mark indicating that vessels must not generate excessive wake. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

**25) Speed limit mark**

IHO Definition: A mark indicating that a speed limit applies. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

**26) Stop mark**

IHO Definition: A mark indicating the place where the bow of a ship must stop when traffic lights show red. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

**27) General warning mark**

IHO Definition: A mark indicating that special caution must be exercised in the vicinity of the mark. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

**28) “Sound ship’s siren” mark**

IHO Definition: A mark indicating that a ship should sound its siren or horn. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

**29) Restricted vertical clearance mark**

IHO Definition: A mark indicating the minimum vertical space available for passage. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

**30) Maximum vessel’s draught mark**

IHO Definition: A mark indicating the maximum draught of vessel permitted. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

**31) Restricted horizontal clearance mark**

IHO Definition: A mark indicating the minimum horizontal space available for passage. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

**32) Strong current warning mark**

IHO Definition: A mark warning of strong currents. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

**33) Berthing permitted mark**

IHO Definition: A mark indicating that berthing is allowed. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

**34) Overhead power cable mark**

IHO Definition: A mark indicating an overhead power cable. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).



**35) “Channel edge gradient” mark**

IHO Definition: A mark indicating the gradient of the slope of a dredge channel edge. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

**36) Telephone mark**

IHO Definition: A mark indicating the presence of a telephone. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

**37) Ferry crossing mark**

IHO Definition: A mark indicating that a ferry route crosses the ship route; often used with a “sound ship’s siren” mark. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

**39) Pipeline mark**

IHO Definition: A mark used to indicate the position of submarine pipelines or the point at which they run on to the land. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

**40) Anchorage mark**

IHO Definition: A mark indicating an anchorage area. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

**41) Clearing mark**

IHO Definition: A mark used to indicate a clearing line. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

**42) Control mark**

IHO Definition: A mark indicating the location at which a restriction or requirement exists. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.96, November 2000).

**43) Diving mark**

IHO Definition: A mark indicating that diving may take place in the vicinity. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.96, November 2000).

**44) Refuge beacon**

IHO Definition: A mark providing or indicating a place of safety. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.95, November 2000).

**45) Foul ground mark**

IHO Definition: A mark indicating a foul ground. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.96, November 2000).

**46) Yachting mark**

IHO Definition: A mark installed for use by yachtsmen. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.96, November 2000).

**47) Heliport mark**

IHO Definition: A mark indicating an area where helicopters may land. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.96, November 2000).

**48) GNSS mark**

IHO Definition: A mark indicating a location at which a GNSS position has been accurately determined.

**49) Seaplane landing mark**

IHO Definition: A mark indicating an area where seaplanes land. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.96, November 2000).

**50) Entry prohibited mark**

IHO Definition: A mark indicating that entry is prohibited. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.96, November 2000).

**51) Work in progress mark**

**IHO Definition:** A mark indicating that work (generally construction) is in progress. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.96, November 2000).

52) **Mark with unknown purpose**

**IHO Definition:** A mark whose detailed characteristics are unknown. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.96, November 2000).

53) **Wellhead mark**

**IHO Definition:** A mark indicating a borehole that produces or is capable of producing oil or natural gas. (Adapted from IHO Dictionary – S-32).

54) **Channel separation mark**

**IHO Definition:** A mark indicating the point at which a channel divides separately into two channels. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.96, November 2000).

55) **Marine farm mark**

**IHO Definition:** A mark indicating the existence of a fish, mussel, oyster or pearl farm/ culture. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.96, November 2000).

56) **Artificial reef mark**

**IHO Definition:** A mark indicating the existence or the extent of an artificial reef. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.96, November 2000).

57) **Ice mark**

**IHO Definition:** A mark, used year round, that may be submerged when ice passes through the area [

**Comment [j166]:** S-57  
Extension 06/01.

**Remarks:**

- A mark may be a beacon, a buoy, a signpost or may take another form.

## 22.64 Category of tidal stream (CAT\_TS)

**Category of tidal stream:** IHO Definition:

1) **Flood stream**

**IHO Definition:** The horizontal movement of water associated with the rising tide. Flood streams generally set towards the shore, or in the direction of the tide progression. Also called flood, flood current or ingoing stream. (Adapted from IHO Dictionary – S-32).

2) **Ebb stream**

**IHO Definition:** The horizontal movement of water associated with falling tide. Ebb streams generally set seaward, or in the opposite direction to the tide progression. Also called ebb, ebb current or outgoing stream. (IHO Dictionary – S-32).

3) **Other tidal flow**

**IHO Definition:** Any other horizontal movement of water associated with tides, e.g. rotary flow. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.97, November 2000).

## 22.65 Category of Traffic Separation Scheme (CATTSS)

**Category of traffic separation scheme:** IHO Definition:

1) **IMO - adopted**

**IHO Definition:** A defined Traffic Separation Scheme that has been adopted as an IMO routing measure. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.99, November 2000).

2) **Not IMO - adopted**

**IHO Definition:** A defined Traffic Separation Scheme that has not been adopted as an IMO routing measure. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.99, November 2000).

## 22.66 Category of vegetation (CATVEG)

### Category of land vegetation: IHO Definition:

#### 1) Grass

IHO Definition: Vegetation belonging to a group of plants with green blades that are eaten by cattle, sheep, etc. (The Concise Oxford Dictionary).

#### 3) Bush

IHO Definition: A shrub or clump of shrubs with stems of moderate length. (The Concise Oxford Dictionary).

#### 4) Deciduous wood

IHO Definition: A wood with trees that shed their leaves annually. (Bundesamt für Seeschifffahrt und Hydrographie, Germany).

#### 5) Coniferous wood

IHO Definition: A wood with evergreen trees of a group usually bearing cones, including yews, cedars and redwoods. (Bundesamt für Seeschifffahrt und Hydrographie, Germany).

#### 6) Wood in general (inc mixed wood)

IHO Definition: Growing trees densely occupying a tract of land. (The Concise Oxford Dictionary).

#### 7) Mangroves

IHO Definition: One of several genera of tropical trees or shrubs which produce many prop roots and grow along low lying coasts into shallow water. (IHO Dictionary – S-32).

#### 10) Mixed crops

IHO Definition: A mixture of arable crops.

#### 11) Reed

IHO Definition: Any of various water or marsh plants with a firm stem. (The Concise Oxford Dictionary).

#### 12) Moss

IHO Definition: any small cryptogamous plant of the class Musci, growing in dense clusters on the surface of the ground in bogs, on trees, stones, etc. (The Concise Oxford Dictionary).

#### 13) Tree in general

IHO Definition: An individual woody perennial plant, typically having a single stem or trunk growing to a considerable height and bearing lateral branches at some distance from the ground. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

#### 14) Evergreen tree

IHO Definition: Having green foliage all the year round. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

#### 15) Coniferous tree

IHO Definition: A cone-bearing, needle-leaved or scale-leaved evergreen tree. (Adapted from The New Encyclopedia Britannica, 15th Edition 1991).

#### 16) Palm tree

IHO Definition: A tropical or sub-tropical tree, shrub or vine having a tall, unbranched, columnar trunk. The trunk is crowned by a tuft or large, pleated fan or feather shaped leaves with stout sheathing and often prickly petioles (stalks), the persistent bases of which frequently clothe the trunk. (Adapted from The New Encyclopedia Britannica, 15th Edition 1991).

#### 17) Nipa palm tree

IHO Definition: (Also called Nypa palm). A rare palm tree with regular branching involving equal or sub-equal division of the apex that results in forking. (Adapted from The New Encyclopedia Britannica, 15th Edition 1991).

**18) Casuarina tree**

IHO Definition: (Also called beefwood, Australian pine, ironwood, she-oak, swamp oak, whistling pine). A tree characterized by slender, green, often drooping branches that are deeply grooved and that bear, at intervals, whorls of fine leaves. (Adapted from The New Encyclopedia Britannica, 15th Edition 1991).

**19) Eucalypt tree**

IHO Definition: An instance of a large genus of mostly very large trees (90 metres). (Adapted from The New Encyclopaedia Britannica, 15th Edition 1991).

**20) Deciduous tree**

IHO Definition: Sheds its leaves each year at the end of the period of growth. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

**21) Mangrove tree**

IHO Definition: One of several genera of tropical trees or shrubs which produce many prop roots and grow along low lying coasts in to shallow waters. (IHO Dictionary – S-32).

**22) Filao tree**

IHO Definition: Casuarina equisetifolia, the most widespread and well-known member of the family Casuarinaceae. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

**22.67 Category of water turbulence (CATWAT)**

**Category of water turbulence:** IHO Definition:

**1) Breaker**

IHO Definition: A wave breaking on the shore, over a reef, etc. Breakers may be roughly classified into three kinds, although the categories may overlap: spilling breakers break gradually over a considerable distance; plunging breakers tend to curl over and break with a crash; and surging breakers peak up, but then instead of spilling or plunging they surge up on the beach face. The French word “brisant” is also used for the obstacle causing the breaking of the wave. (IHO Dictionary – S-32).

**2) Eddies**

IHO Definition: Circular movements of water usually formed where currents pass obstructions, between two adjacent currents flowing counter to each other, or along the edge of a permanent current. (IHO Dictionary – S-32).

**3) Overfalls**

IHO Definition: Short, breaking waves occurring when a strong current passes over a shoal or other submarine obstruction or meets a contrary current or wind. (IHO Dictionary – S-32).

**4) Tide rips**

IHO Definition: Small waves formed on the surface of water by the meeting of opposing tidal currents or by a tidal current crossing an irregular bottom. (IHO Dictionary – S-32).

**5) Bombora**

IHO Definition: A wave that forms over a submerged offshore reef or rock, sometimes (in very calm weather or at high tide) nearly swelling but in other conditions breaking heavily and producing a dangerous stretch of broken water; the reef or rock itself. Also called bumbora or bomborah. (Australian National Dictionary).

**22.68 Category of weed/kelp (CATWED)**

**Category of weed/kelp:** IHO Definition:

**1) Kelp**

IHO Definition: A giant plant sometimes 60 metres long with no roots, it is anchored by hold-fasts or tendrils up to 10 metres long, that cling to rock. Gas filled bubbles on fronds act as floats keeping the kelp just below

the surface. (Earth Sciences References; Mary McNeil).

2) **Seaweed**

IHO Definition: General name for marine plants of the algae class which grow in long narrow ribbons. Also called **seagrass**. (International Maritime Dictionary, 2nd Edition).

3) **Seagrass**

IHO Definition: Any grass-like marine alga. Eelgrass is one of the best known **seagrasses**. (IHO Dictionary – S-32).

4) **Sargasso**

IHO Definition: A certain type of **seaweed**, or more generally, a large floating mass of this **seaweed**. (IHO Dictionary – S-32).

## 22.69 Category of wreck (CATWRK)

**Category of wreck:** IHO Definition:

1) **Non-dangerous wreck**

IHO Definition: A wreck which is not considered to be dangerous to surface navigation. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.105, November 2000).

2) **Dangerous wreck**

IHO Definition: A wreck submerged at such a depth as to be considered dangerous to surface navigation. (IHO Dictionary – S-32).

3) **Distributed remains of wreck**

IHO Definition: (Foul ground). An area over which it is safe to navigate but which should be avoided for anchoring, taking the ground or ground fishing. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.105, November 2000).

4) **Wreck showing mast/masts**

IHO Definition: Wreck of which only the mast(s) is visible at the sounding datum indicated. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.105, November 2000).

5) **Wreck showing any portion of hull or superstructure**

IHO Definition: Wreck of which any portion of the hull or superstructure is visible at the sounding datum indicated. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.105, November 2000).

## 22.70 Colour (COLOUR)

**Colour:** IHO Definition:

- 1) **White**
- 2) **Black**
- 3) **Red**
- 4) **Green**
- 5) **Blue**
- 6) **Yellow**
- 7) **Grey**
- 8) **Brown**
- 9) **Amber**
- 10) **Violet**

- 11) **Orange**
- 12) **Magenta**
- 13) **Pink**

## 22.71 Colour pattern (COLPAT)

**Colour pattern:** IHO Definition:

### 1) Horizontal stripes

IHO Definition: Straight bands or stripes of differing colours painted horizontally. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.113, November 2000).

### 2) Vertical stripes

IHO Definition: Straight bands or stripes of differing colours painted vertically. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.113, November 2000).

### 3) Diagonal stripes

IHO Definition: Straight bands or stripes of differing colours painted diagonally (i.e. not horizontally or vertically). (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.113, November 2000).

### 4) Squared

IHO Definition: Often referred to as checker plate, where alternate colours are used to create squares similar to a chess or draught board. The pattern may be straight or diagonal. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.113, November 2000).

### 5) Stripes (direction unknown)

IHO Definition: Straight bands or stripes of differing colours painted in an unknown direction. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.113, November 2000).

### 6) Border stripe

IHO Definition: A band or stripe of colour which is displayed around the outer edge of the object, which may also form a border to an inner pattern or plain colour. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.113, November 2000).

## 22.72 Communication channel (COMCHA)

**Communication channel:** IHO Definition: A channel number assigned to a specific radio frequency, frequencies or frequency band. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.114, November 2000).

Expected input: Enter specific VHF-Channel.

Indication: Each VHF-Channel should be indicated **in square brackets** by 2 digits and up to 2 characters (A-Z).

Format: [XXXX];[XXXX];....

Example: **[07]** for VHF-Channel 7  
**[16]** for VHF-Channel 16

Remarks:

- The attribute “communication channel” encodes the various VHF-Channels used for communication.
- The indication of several VHF-Channels is possible.

**Comment [j167]:** MD8 – 8.CL4 and 8.Co.5.

## 22.73 Condition (CONDTN)

**Condition:** IHO Definition:

### 1) Under construction

IHO Definition: **Being built but not yet capable of function.** (Defence Geospatial Information Working Group;

Feature Data Dictionary Register, 2010).

2) **Ruined**

IHO Definition: A structure in a decayed or deteriorated condition resulting from neglect or disuse, or a damaged structure in need of repair. (IHO Dictionary – S-32).

3) **Under reclamation**

IHO Definition: An area of the sea that is being reclaimed as land, usually by the dumping of earth and other material. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.118, November 2000).

4) **Wingless**

IHO Definition: A windmill or windmotor from which the vanes or turbine blades are missing. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.118, November 2000).

5) **Planned construction**

IHO Definition: Detailed planning has been completed but construction has not been initiated. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

Remarks:

- The attribute “condition” encodes the various conditions of buildings and other constructions. The default “condition” should be considered to be completed, undamaged and working normally. This attribute should, therefore, only be used to indicate **features** whose condition is anything other than “normal”.

## 22.74 Conspicuous, radar (CONRAD)

**Conspicuous, radar:** IHO Definition:

1) **Radar conspicuous**

IHO Definition: An object which returns a strong radar echo. (IHO Dictionary, S-32).

2) **Not radar conspicuous**

IHO Definition: An object which does not return a particularly strong radar echo. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.119, November 2000).

3) **Radar conspicuous (has radar reflector)**

IHO Definition: An object which returns a strong radar echo, having a radar reflector.. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.119, November 2000).

4) **Radar conspicuous (has radar Target Enhancer)**

IHO Definition: An object which returns a strong radar echo, having a Radar Target Enhancer.

**Comment [j168]:** S-57  
Extension 06/01.

## 22.75 Conspicuous, visually (CONVIS)

**Conspicuous, visually:** IHO Definition:

1) **Visually conspicuous**

IHO Definition: Term applied to an object either natural or artificial which is distinctly and notably visible from seaward. (IHO Dictionary – S-32).

2) **Not visually conspicuous**

IHO Definition: An object which is visible from seaward, but is not conspicuous. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.120, November 2000).

## 22.76 Current velocity (CURVEL)

**Current velocity:** IHO Definition: The rate of travel of a current in knots. (S-57 Edition 3.1, Appendix A –

Chapter 2, Page 2.121, November 2000).

Unit: Knot (kt)

Resolution: 0.1kt.

Format: xx.x

Example: 1.6 for a velocity of 1.6 knots

Remarks:

- The attribute “current velocity” indicates the speed of the current in knots.

## 22.77 Date end (DATEND)

**Date end:** IHO Definition:

Indication: The “date end” should be encoded using 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD). When no specific month and/or day is required/known, indication of the month and/or day is omitted. This conforms to ISO 8601: 1988.

Format: CCYYMMDD (full date, mandatory)  
 CCYYMM (no specific day required – mandatory)  
 CCYY (no specific month required – mandatory)

Example: 20101203 for 03 December 2010 as ending date.

Remarks:

- The attribute “date end” indicates the latest date on which a feature (e.g. a buoy) will be present. This attribute is to be used to indicate the removal or cancellation of a feature at a specific date in the future. See also “periodic date end”.

**Comment [j169]:** MD8 – 4.Cl.7 and 4.Co.9.

**Comment [j170]:** MD8 – 4.Cl.10 and 4.Co.12.

## 22.78 Date start (DATSTA)

**Date start:** IHO Definition:

Indication: The “date start” should be encoded using 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD). When no specific month and/or day is required/known, indication of the month and/or day is omitted. This conforms to ISO 8601: 1988.

Format: CCYYMMDD (full date, mandatory)  
 CCYYMM (no specific day required – mandatory)  
 CCYY (no specific month required – mandatory)

Example: 20101129 for 29 November 2010 as ending date.

Remarks:

- The attribute “date start” indicates the earliest date on which a feature (e.g. a buoy) will be present. This attribute is to be used to indicate the deployment or implementation of a feature at a specific date in the future. See also “periodic date start”.

**Comment [j171]:** MD8 – 4.Cl.7 and 4.Co.9.

**Comment [j172]:** MD8 – 4.Cl.10 and 4.Co.12.

## 22.79 Depth range minimum value (DRVAL1)

**Depth range value 1:** IHO Definition: Depth range is the depth from a specified sounding datum as a depth interval bounded by the minimum (shoalest) and maximum (deepest) depth values. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

**depth range minimum value** defines the minimum (shoalest) value of a depth range. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.124, November 2000).

Unit: Defined in the DUNI subfield of the CRSH record or the DUNITS attribute of the M\_UNIT meta feature: metre (m)

Resolution: 0.1m

Format: sxxxxx.x

s: sign, negative values only



**Example:** 50 for a minimum depth of 50 metres

**Remarks:**

- Where the area dries, the value is negative.

## 22.80 Depth range maximum value (DRVAL2)

**Depth range value 2:** IHO Definition: Depth range is the depth from a specified sounding datum as a depth interval bounded by the minimum (shoalest) and maximum (deepest) depth values. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

**depth range maximum value** defines the maximum (deepest) value of a depth range. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.125, November 2000).

Unit: Defined in the DUNI subfield of the CRSH record or the DUNITS attribute of the M\_UNIT meta feature: metre (m)

Resolution: 0.1m

Format: sxxxxx.x

s: sign, negative values only

**Example:** 100 for a maximum depth of 100 metres

**Remarks:**

- Where the area dries, the value is negative or zero (0).

## 22.81 Elevation (ELEVAT)

**Elevation:** IHO Definition: The altitude of the ground level of an object, measured from a specified vertical datum. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.127, November 2000).

Unit: Defined in the HUNI subfield of the CRSH record or the HUNITS attribute of the M\_UNIT meta feature: metre (m).

Resolution: 0.1m

Format: xxx.x

**Example:** 47 for an elevation of 47 metres

## 22.82 Estimated range of transmission (ESTRNG)

**Estimated range of transmission:** IHO Definition: The estimated range of a non-optical electromagnetic transmission. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.128, November 2000).

Unit: Nautical mile (M)

Resolution: 0.1M

Format: xxx.x

**Example:** 45 for a maximum range of 45 nautical miles

**Remarks:**

- The estimated range (distance) assumes "in vacuo" transmission and a standard antenna height of 5 metres. Thus it gives a hint to the mariner whether they are likely to receive transmission at a certain distance from a feature carrying this attribute.

## 22.83 Exhibition condition of light (EXCLIT)

**Exhibition condition of light:** IHO Definition:

- 1) Light shown without change of character

**IHO Definition:** A light shown throughout the 24 hours without change of character. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.129, November 2000).

2) **Daytime light**

**IHO Definition:** A light which is only exhibited by day. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.129, November 2000).

3) **Fog light**

**IHO Definition:** A light which is exhibited in fog or conditions of reduced visibility. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.129, November 2000).

4) **Night light**

**IHO Definition:** A light which is only exhibited at night. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.129, November 2000).

## 22.84 Exposition of sounding (EXPSOU)

**Exposition of sounding:** **IHO Definition:**

1) **Within the range of depth of the surrounding depth area**

**IHO Definition:** The depth corresponds to the depth range of the surrounding depth area. i.e. the depth is not shoaler than the minimum depth of the surrounding depth area or deeper than the maximum depth of the surrounding depth area. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.130, November 2000).

2) **Shoaler than the range of depth of the surrounding depth area**

**IHO Definition:** The depth is shoaler than the minimum depth of the surrounding depth area. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.130, November 2000).

3) **Deeper than the range of depth of the surrounding depth area**

**IHO Definition:** The depth is deeper than the maximum depth of the surrounding depth area. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.130, November 2000).

**Remarks:**

- This attribute indicates **features** with a “value of sounding” not within the range of depth of the surrounding depth area. These **features** could be a potential danger for navigation.

## 22.85 Feature name (OBJNAM)

**Comment [A173]:** If suggested change is accepted, needs to be moved.

**Object name:** **IHO Definition:** The individual name of an object. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.158, November 2000).

## 22.86 Feature name in national language (NOBJNM)

**Comment [A174]:** If suggested change is accepted, needs to be moved.

**Object name in national language:** **IHO Definition:**

**Indication:** Name of object (c...): String of national language characters.

**Format:** c...

**Example:**

**Remarks:**

- The attribute “object name in national language” encodes the individual name of a **feature** in the specified national language.

## 22.87 Function (FUNCTN)

**Function:** **IHO Definition:**

**2) Harbour-masters office**

IHO Definition: Local official who has charge of mooring and berthing of vessels, collecting harbour fees, etc. (Adapted from IHO Dictionary – S-32).

**3) Custom office**

IHO Definition: Serves as a government office where customs duties are collected, the flow of goods are regulated and restrictions enforced, and shipments or vehicles are cleared for entering or leaving a country. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

**4) Health office**

IHO Definition: The office which is charged with the administration of health laws and sanitary inspections. (Adapted from The New Shorter Oxford English Dictionary, 1993).

**5) Hospital**

IHO Definition: An institution or establishment providing medical or surgical treatment for the ill or wounded. (The New Shorter Oxford English Dictionary, 1993).

**6) Post office**

IHO Definition: The public department, agency or organisation responsible primarily for the collection, transmission and distribution of mail. (The New Shorter Oxford English Dictionary, 1993).

**7) Hotel**

IHO Definition: An establishment, especially of a comfortable or luxurious kind, where paying visitors are provided with accommodation, meals and other services. (The New Shorter Oxford English Dictionary, 1993).

**8) Railway station**

IHO Definition: A building with platforms where trains arrive, load, discharge and depart. (The New Shorter Oxford English Dictionary, 1993).

**9) Police station**

IHO Definition: The headquarters of a local police force and that is where those under arrest are first charged. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

**10) Water-police station**

IHO Definition: The headquarters of a local water-police force. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

**11) Pilot office**

IHO Definition: The office or headquarters of pilots; the place where the services of a pilot may be obtained. (IHO Dictionary – S-32).

**12) Pilot lookout**

IHO Definition: A distinctive structure on shore from which personnel keep watch upon events at sea or along the coast. (IHO Dictionary – S-32).

**13) Bank office**

IHO Definition: An office for custody, deposit, loan, exchange or issue of money. (Adapted from The New Shorter Oxford English Dictionary, 1993).

**14) Headquarters for district control**

IHO Definition: The quarters of an executive officer (director, manager, etc.) with responsibility for an administrative area. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.132, November 2000).

**15) Transit shed/warehouse**

IHO Definition: A building or part of a building for storage of wares or goods. (Adapted from The New Shorter Oxford English Dictionary, 1993).

**16) Factory**

IHO Definition: A building or buildings with equipment for manufacturing; a workshop. (The New Shorter Oxford English Dictionary, 1993).

**17) Power station**

IHO Definition: A stationary plant containing apparatus for large scale conversion of some form of energy (such as hydraulic, steam, chemical or nuclear energy) into electrical energy. (McGraw-Hill Dictionary of Scientific and Technical Terms, 3rd Edition, 1984).

**18) Administrative**

IHO Definition: A building for the management of affairs. (Adapted from The New Shorter Oxford English Dictionary, 1993).

**19) Educational facility**

IHO Definition: An establishment for teaching and learning (e.g. school, college, university, etc.). (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

**20) Church**

IHO Definition: A building for public Christian worship. (The New Shorter Oxford English Dictionary, 1993).

**21) Chapel**

IHO Definition: A place for Christian worship other than a parish, cathedral or church, especially one attached to a private house or institution. (The New Shorter Oxford English Dictionary, 1993).

**22) Temple**

IHO Definition: A building for public Jewish worship. (Adapted from The New Shorter Oxford English Dictionary, 1993).

**23) Pagoda**

IHO Definition: A Hindu or Buddhist temple or sacred building. (The New Shorter Oxford English Dictionary, 1993).

**24) Shinto shrine**

IHO Definition: A building for public Shinto worship. (Adapted from The New Shorter Oxford English Dictionary, 1993).

**25) Buddhist temple**

IHO Definition: See pagoda..

**26) Mosque**

IHO Definition: A Muslim place of worship. (The New Shorter Oxford English Dictionary, 1993).

**27) Marabout**

IHO Definition: A shrine marking the burial place of a Muslim holy man. (The New Shorter Oxford English Dictionary, 1993).

**28) Lookout**

IHO Definition: Keeping a watch upon events at sea or along the coast. (Adapted from IHO Dictionary – S-32).

**29) Communication**

IHO Definition: Transmitting and/or receiving electronic communication signals. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

**30) Television**

IHO Definition: A system for reproducing on a screen visual images transmitted (usually with sound) by radio signals. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

**31) Radio**

IHO Definition: Transmitting and/or receiving radio-frequency electromagnetic waves as a means of communication. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

**32) Radar**

IHO Definition: A method, system or technique of using beamed, reflected, and timed radio waves for

detecting, locating, or tracking objects, and for measuring altitudes. (IHO Dictionary – S-32).

33) **Light support**

IHO Definition: A structure serving as a support for one or more lights. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

34) **Microwave**

IHO Definition: Broadcasting and receiving signals using microwaves. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.133, November 2000).

35) **Cooling**

IHO Definition: Generation of chilled liquid and/or gas for cooling purposes. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

36) **Observation**

IHO Definition: A place from which the surroundings can be observed but at which a watch is not habitually maintained. (Adapted from IHO Dictionary – S-32).

37) **Time ball**

IHO Definition: A visual time signal in the form of a ball. (IHO Dictionary – S-32).

38) **Clock**

IHO Definition: Instrument for measuring time and recording hours. (IHO Dictionary – S-32).

39) **Control**

IHO Definition: Used to control the flow of traffic within a specified range of an installation. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

40) **Airship mooring**

IHO Definition: Equipment or structure to secure an airship. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

41) **Stadium**

IHO Definition: An arena for holding and viewing events. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

42) **Bus station**

IHO Definition: A building where buses and coaches regularly stop to take on and/or let off passengers, especially for long-distance travel. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

43) **Passenger terminal building**

IHO Definition: A building within a terminal for the loading and unloading of passengers. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

44) **Sea rescue control**

IHO Definition: A unit responsible for promoting efficient organization of search and rescue services and for coordinating the conduct of search and rescue operations within a search and rescue region. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

45) **Observatory**

IHO Definition: A building designed and equipped for making observations of astronomical, meteorological, or other natural phenomena. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

46) **Ore crusher**

IHO Definition: A building or structure used to crush ore.

**Comment [J175]:** S-57  
Extension 06/01.

## 22.88 Height (HEIGHT)

**Height:** IHO Definition: The value of the vertical distance to the highest point of the object, measured from a specified vertical datum. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.134, November 2000).

Unit: Defined in the HUNI subfield of the CRSH record or the HUNITS attribute of the M\_UNIT meta feature: metre (m)

Resolution: 0-1m

Format: xxx.x

Example: 73 for a height of 73 metres

Remarks:

- Height must not be used for floating features.

## 22.89 Horizontal clearance (HORCLR)

**Horizontal clearance:** IHO Definition: The width of an object, such as a canal or a tunnel, which is available for safe navigation. This may, or may not, be the same as the total physical width of the object. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.137, November 2000).

Unit: Defined in the HUNI subfield of the CRSH record or the HUNITS attribute of the M\_UNIT meta feature: metre (m)

Resolution: 0-1m

Format: xxx.x

Example: 125 for a width of 125 metres

## 22.90 Horizontal length (HORLEN)

**Horizontal length:** IHO Definition: A measurement of the longer of two linear axis. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

Unit: Defined in the HUNI subfield of the CRSH record or the HUNITS attribute of the M\_UNIT meta feature: metre (m)

Resolution: 0-1m

Format: xxx.x

Example: 95 for a width of 95 metres

## 22.91 Horizontal width (HORWID)

**Horizontal width:** IHO Definition: A measurement of the shorter of two linear axis. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

Unit: Defined in the HUNI subfield of the CRSH record or the HUNITS attribute of the M\_UNIT meta feature: metre (m)

Resolution: 0-1m

Format: xxx.x

Example: 12.6 for a width of 12.6 metres

## 22.92 Ice factor (ICEFAC)

**Ice factor:** IHO Definition: The value of the maximum variation in the vertical clearance of an overhead cable due to an accumulation of ice. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.140, November 2000).

Unit: Defined in the HUNI subfield of the CRSH record or the HUNITS attribute of the M\_UNIT meta feature: metre (m)

Resolution: 0-1m

Format: xx.x

Example: 2.5 for a reduction of 2-5 metres in the vertical clearance.

### 22.93 Information (INFORM)

**Information:** IHO Definition: Textual information about the feature. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.141, November 2000).

Remarks:

- This attribute should be used, for example, to hold the information that is shown on paper charts by cautionary and explanatory notes.
- No formatting of text is possible within **information**. If formatted text is required, then the attribute **textual description** must be used.

### 22.94 Information in national language (NINFOM)

**Information in national language:** IHO Definition:

Indication: Text (c...): Textual information in national language characters.

Format: c...

Example:

Remarks:

- The attribute “information in national language” encodes any textual information about an object using a specified national language.
- This attribute should be used, for example, to hold the information that is shown on paper charts by cautionary and explanatory notes.
- No formatting of text is possible within **information in national language**. If formatted text is required, then the attribute **NTXTDS** must be used.

**Comment [J176]:** MD8 – 1.Cl.23 and 1.Co.16.

### 22.95 Jurisdiction (JRSDTN)

**Jurisdiction:** IHO Definition: The jurisdiction applicable to an administrative area. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.142, November 2000).

#### 1) International

IHO Definition: Involving more than one country; covering more than one national area. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.142, November 2000).

#### 2) National

IHO Definition: An area administered or controlled by a single nation. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.142, November 2000).

#### 3) National sub-division

IHO Definition: An area smaller than the nation in which it lies. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.142, November 2000).

### 22.96 Lifting capacity (LIFCAP)

**Lifting capacity:** IHO Definition: The specific safe lifting capacity of an object. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.145, November 2000).

Unit: Tonne (t)

Resolution: 0-1t

Format: xxx.x

Minimum value: 0

Example: 120 for a lifting capacity of 120 tonnes

## 22.97 Light characteristic (LITCHR)

**Light characteristic:** IHO Definition:

### 1) Fixed

IHO Definition: A signal light that shows continuously, in any given direction, with constant luminous intensity and colour. (IHO Dictionary – S-32).

### 2) Flashing

IHO Definition: A rhythmic light in which the total duration of light in a period is clearly shorter than the total duration of darkness and all the appearances of light are of equal duration. It may be:

- *Single flashing:* A flashing light in which a flash is regularly repeated at a rate of less than 50 flashes per minutes.
- *Group flashing:* A flashing light in which a group of two or more flashes, which are specified in number, is regularly repeated.
- *Group flashing:* A flashing light in which a group of two or more flashes, which one or more flashes, which are specified in number, is regularly repeated, and the groups comprise different numbers of flashes. (IALA International Dictionary of Aids to Marine Navigation).

### 3) Long-flashing

IHO Definition: A single-flashing light in which an appearance of light of not less than two seconds duration is regularly repeated. (IALA International Dictionary of Aids to Marine Navigation).

### 4) Quick-flashing

IHO Definition: A rhythmic light in which flashes are repeated at a rate of not less than 50 flashes per minutes but less than 80 flashes per minutes. It may be:

- *Continuous quick-flashing:* A quick-flashing light in which a flash is regularly repeated.
- *Group quick-flashing:* A quick-flashing light in which a group of two or more flashes, which are specified in number, is regularly repeated.

(IALA International Dictionary of Aids to Marine Navigation).

### 5) Very quick-flashing

IHO Definition: A rhythmic light in which flashes are repeated at a rate of not less than 80 flashes per minute but less than 160 flashes per minute. It may be:

- *Continuous very quick-flashing:* A very quick-flashing light in which a flash is regularly repeated.
- *Group very quick-flashing:* A very quick-flashing light in which a group of two or more flashes, which are specified in number, is regularly repeated.

(IALA International Dictionary of Aids to Marine Navigation).

### 6) Continuous ultra quick-flashing

IHO Definition: A rhythmic light in which flashes are regularly repeated at a rate of not less than 160 flashes per minute. (IALA International Dictionary of Aids to Marine Navigation).

**Comment [J177]:** MD8 – 8.Co.13.

### 7) Isophased

IHO Definition: A light with all durations of light and darkness equal. (IHO Dictionary – S-32).

### 8) Occulting

IHO Definition: A rhythmic light in which the total duration of light in a period is clearly longer than the total duration of darkness and all the eclipses are of equal duration. It may be:

- *Single-occulting:* An occulting light in which an eclipse is regularly repeated.
- *Group-occulting:* An occulting light in which a group of two or more eclipses, which are specified in number, is regularly repeated.
- *Composite group-occulting:* An occulting light in which a sequence of groups of one or more eclipses, which are specified in number, is regularly repeated, and the groups comprise different numbers of



eclipses.

(IALA International Dictionary of Aids to Marine Navigation). [

**Comment [j178]:** MD8 – 8.Co.13.

9) **Interrupted quick-flashing**

IHO Definition: A quick light in which the sequence of flashes is interrupted by regularly repeated eclipses of constant and long duration. (IHO Dictionary – S-32, Edition 5).

10) **Interrupted very quick-flashing**

IHO Definition: A light in which the very rapid alterations of light and darkness are interrupted at regular intervals by eclipses of long duration. (IHO Dictionary – S-32).

11) **Interrupted ultra quick-flashing**

IHO Definition: A light in which the ultra quick flashes (160 or more per minute) are interrupted at regular intervals by eclipses of long duration. (IHO Dictionary – S-32).

12) **Morse**

IHO Definition: A rhythmic light in which appearances of light of two clearly different durations are grouped to represent a character or characters in the Morse code. (IHO Dictionary – S-32).

13) **Fixed and flash**

IHO Definition: A rhythmic light in which a fixed light is combined with a flashing light of higher luminous intensity. (IHO Dictionary – S-32). [

**Comment [j179]:** MD8 – 8.Co.12.

14) **Flash and long flash**

IHO Definition:

15) **Occulting and flash**

IHO Definition:

16) **Fixed and long flash**

IHO Definition:

**Comment [j180]:** MD8 – 8.CL8 and 8.CL11.

17) **Occulting alternating**

IHO Definition:

18) **Long-flash alternating**

IHO Definition:

19) **Flash alternating**

IHO Definition:

25) **Quick-flash plus long-flash**

IHO Definition:

**Comment [j181]:** Value 20 (group alternating) removed – MD8 – 8.Co.10.

26) **Very quick-flash plus long flash**

IHO Definition:

27) **Ultra quick-flash plus long-flash**

IHO Definition:

28) **Alternating**

IHO Definition: A signal light that shows continuously, in any given direction, two or more colours in a regularly repeated sequence with a regular periodicity. (IALA International Dictionary of Aids to Marine Navigation). [

**Comment [j182]:** MD8 – 8.CL7 and 8.Co.9.

29) **Fixed and alternating flashing**

IHO Definition:

Remarks:

- A selection of the above characteristics is defined and illustrated diagrammatically in IHO Chart Specifications,

S-4 – B-471.2.

**22.98 Light visibility (LITVIS)****Light visibility:** IHO Definition:**1) High intensity**

IHO Definition: Non-marine lights with a higher power than marine lights and visible from well off shore (often "Aero" lights). (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.148, November 2000).

**2) Low intensity**

IHO Definition: Non-marine lights with lower power than marine lights. (Bundesamt für Seeschifffahrt und Hydrographie, Germany).

**3) Faint**

IHO Definition: A decrease in the apparent intensity of a light which may occur in the case of partial obstructions. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.148, November 2000).

**4) Intensified**

IHO Definition: A light in a sector is intensified (i.e. has longer range than other sectors). (Bundesamt für Seeschifffahrt und Hydrographie, Germany).

**5) Unintensified**

IHO Definition: A light in a sector is unintensified (i.e. has shorter range than other sectors). (Bundesamt für Seeschifffahrt und Hydrographie, Germany).

**6) Visibility deliberately restricted**

IHO Definition: A light sector is deliberately reduced in intensity, for example to reduce its effect on a built-up area. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.148, November 2000).

**7) Obscured**

IHO Definition: Said of the arc of a light sector designated by its limiting bearings in which the light is not visible from seaward. (IHO Dictionary – S-32).

**8) Partially obscured**

IHO Definition: This value specifies that parts of the sector are obscured.. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.148, November 2000).

**9) Visible in line of range**

IHO Definition: Lights that must be in line to be visible: |

**Comment [j183]:** S-57  
Extension 06/01.

**Remarks:**

- The attribute "light visibility" encodes the specific visibility of a light, with respect to the light's intensity and ease of recognition.

**22.99 Marks navigational – system of (MARSYS)****Marks navigational – System of:** IHO Definition:**1) IALA A**

IHO Definition: Navigational aids conform to the International Association of Lighthouse Authorities - IALA A system. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.149, November 2000).

**2) IALA B**

IHO Definition: Navigational aids conform to the International Association of Lighthouse Authorities - IALA B system. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.149, November 2000).

**9) No system**

**IHO Definition:** Navigational aids do not conform to any defined system. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.149, November 2000).

#### 10) Other system

**IHO Definition:** Navigational aids conform to a defined system other than International Association of Lighthouse Authorities -IALA. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.149, November 2000).

### 22.100 Multiplicity of lights (MLTYLT)

**Multiplicity of lights:** **IHO Definition:** The number of lights of identical character that exist as a co-located group. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.150, November 2000).

**Unit:** None

**Resolution:** 1

**Format:** xx

**Example:** 5 for 5 co-located lights

### 22.101 Nationality (NATION)

**Nationality:** **IHO Definition:**

**Indication:** The nationality is encoded by a 2 character code following ISO 3166 (refer to S-57 Appendix A).

**Format:** c2 (mandatory)

**Example:** AU for Australia

**Remarks:**

- The attribute "nationality" indicates the nationality of the specific feature.

### 22.102 Nature of construction (NATCON)

**Nature of construction:** **IHO Definition:**

#### 1) Masonry

**IHO Definition:** Constructed of stones or bricks, usually quarried, shaped, and mortared. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

#### 2) Concreted

**IHO Definition:** Constructed of concrete, a material made of sand and gravel that is united by cement into a hardened mass used for roads, foundations, etc. (Adapted from the Illustrated Contemporary Dictionary, Encyclopedic Edition, 1978).

#### 3) Loose boulders

**IHO Definition:** Constructed from large stones or blocks of concrete, often placed loosely for protection against waves or water turbulence. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.152, November 2000).

#### 4) Hard surfaced

**IHO Definition:** Constructed with a surface of hard material, usually a term applied to roads surfaced with asphalt or concrete. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.152, November 2000).

#### 5) Unsurfaced

**IHO Definition:** Constructed with no extra protection, usually a term applied to roads not surfaced with a hard material. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.152, November 2000).

#### 6) Wooden

**IHO Definition:** Constructed from wood. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.152, November 2000).

7) **Metal**

IHO Definition: Constructed from metal. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.152, November 2000).

8) **Glass reinforced plastic (GRP)**

IHO Definition: Constructed from a plastic material strengthened with fibres of glass. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.152, November 2000).

9) **Painted**

IHO Definition: The application of paint to some other construction or natural feature. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.152, November 2000).

**22.103 Nature of surface (NATSUR)**

**Nature of surface:** IHO Definition:

1) **Mud**

IHO Definition: Soft, wet earth. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.153, November 2000).

2) **Clay**

IHO Definition: (Particles of less than 0.002mm); stiff, sticky earth that becomes hard when baked. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.153, November 2000).

3) **Silt**

IHO Definition: An unconsolidated sediment whose particles range in size from 0.0039 to 0.0625 millimetres in diameter (between clay and sand size). (IHO Dictionary – S-32).

4) **Sand**

IHO Definition: Loose material consisting of small but easily distinguishable, separate grains, between 0.0625 and 2.000 millimetres in diameter. (IHO Dictionary – S-32).

5) **Stone**

IHO Definition: A general term for rock fragments ranging in size from pebbles and gravel to boulders or large rock masses. (IHO Dictionary – S-32).

6) **Gravel**

IHO Definition: (Particles of 2.0-4.0mm); small stones with coarse sand. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.153, November 2000).

7) **Pebbles**

IHO Definition: A small stone worn smooth and rounded by the action of water, sand, ice, etc. ranging in diameter between 4 and 64 millimetres. (IHO Dictionary – S-32).

8) **Cobbles**

IHO Definition: A naturally rounded stone larger than a pebble. (IHO Dictionary – S-32).

9) **Rock**

IHO Definition: Any formation of natural origin that constitutes an integral part of the lithosphere. The natural occurring material that forms firm, hard, and solid masses. (Adapted from IHO Dictionary – S-32).

11) **Lava**

IHO Definition: The fluid or semi-fluid matter flowing from a volcano. The substance that results from the cooling of the molten rock. Part of the ocean bed is composed of lava. (IHO Dictionary – S-32).

14) **Coral**

IHO Definition: Hard calcareous skeletons of many tribes of marine polyps. (IHO Dictionary – S-32).

17) **Shells**

IHO Definition: Exoskeletons of various water dwelling animals. (Adapted from [IHO Dictionary – S-32](#)).

18) **Boulder**

IHO Definition: A rounded rock with diameter of 256 mm or larger. (Adapted from [IHO Dictionary – S-32](#)).

Remarks:

- The attribute “nature of surface” encodes the general nature of the material of which the land surface or the sea bed is composed.
- Mixed bottom: where the seabed comprises a mixture of material, the main constituent is given first e.g. fine sand with mud and shells would be indicated as 4,1,17.
- Mud, sand, stone, rock are terms used for the general description. Clay, silt, gravel, pebbles, cobbles are more specific terms related to particle size.

## 22.104 Nature of surface – qualifying terms (NATQUA)

**Nature of surface – qualifying terms:** IHO Definition:

1) **Fine**

IHO Definition: Falls within the smallest size continuum for a particular nature of surface term. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.155, November 2000).

2) **Medium**

IHO Definition: Falls within the moderate size continuum for a particular nature of surface term. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.155, November 2000).

3) **Coarse**

IHO Definition: Falls within the largest size continuum for a particular nature of surface term. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.155, November 2000).

4) **Broken**

IHO Definition: Fractured or in pieces. (Adapted from Webster's II New Riverside Dictionary, 1984).

5) **Sticky**

IHO Definition: Having an adhesive or glue like property. (Adapted from Webster's II New Riverside Dictionary, 1984).

6) **Soft**

IHO Definition: Not hard or firm. (Adapted from Webster's II New Riverside Dictionary, 1984).

7) **Stiff**

IHO Definition: Not pliant; thick, resistant to flow. (Adapted from Webster's II New Riverside Dictionary, 1984).

8) **Volcanic**

IHO Definition: Composed of or containing material ejected from a volcano. (Adapted from Webster's II New Riverside Dictionary, 1984).

9) **Calcareous**

IHO Definition: Composed of or containing calcium or calcium carbonate. ([IHO Dictionary – S-32](#)).

10) **Hard**

IHO Definition: Firm; usually refers to an area of the sea floor not covered by unconsolidated sediment. ([IHO Dictionary – S-32](#) and adapted from Webster's II New Riverside Dictionary, 1984).

Remarks:

- The attribute “nature of surface - qualifying terms” encodes the nature of various forms of natural surface materials in terms of their size, morphology and consistency.

### 22.105 Orientation (ORIENT)

**Orientation:** IHO Definition: The angular distance measured from true north to the major axis of the object. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

Unit: Degree (°)

Resolution: 0.01°

Format: xxx.xx

Minimum value: 0

Maximum value: 360

Example: **246.7** for an orientation of 246.7 degrees

### 22.106 Periodic date end (PEREND)

**Periodic date end:** IHO Definition: The end of the active period for a seasonal feature (e.g. a buoy). See also "date end". (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.160, November 2000).

Indication: The "periodic date end" should be encoded using 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD). When no specific year is required (i.e. the object is removed at the same time each year) the following two cases may be considered:

- same day each year: --MMDD
- same month each year: --MM

This conforms to ISO 8601:1988.

Format: CCYYMMDD (full date, **mandatory**)  
 --MMDD (same day each year, **mandatory**)  
 --MM (same month each year, **mandatory**)

Example: **--1015** for an ending date of 15 October each year.

### 22.107 Periodic date start (PERSTA)

**Periodic date start:** IHO Definition: The start of the active period for a seasonal feature (e.g. a buoy). See also "date start". (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.161, November 2000).

Indication: The "periodic date start" should be encoded using 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD). When no specific year is required (i.e. the object is removed at the same time each year) the following two cases may be considered:

- same day each year: --MMDD
- same month each year: --MM

This conforms to ISO 8601:1988.

Format: CCYYMMDD (full date, **mandatory**)  
 --MMDD (same day each year, **mandatory**)  
 --MM (same month each year, **mandatory**)

Example: **--04** for an operation starting in April each year.

### 22.108 Pictorial representation (PICREP)

**Pictorial representation:** IHO Definition: Indicates whether a pictorial representation of the object is available. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.162, November 2000).

Indication: The string encodes the file name of a **single** external graphic file (pixel/vector).

Remarks:

- The "pictorial representation" could be a drawing or a photo.

### 22.108.1 Views and sketches, viewpoints

If it is required to indicate a drawing or a photograph, the attribute **pictorial representation** must be used to indicate the file name (without the path) of the external graphical file. **Picture files that form part of the ENC must be in Tagged Image File (TIF) format.**

**Remarks:**

- Clause **X.X** of the **S-101 ENC** Product Specification specifies the content of an ENC exchange set, including the option to include picture files. **The clause mandates the use of TIF as the format to be used for these files, but states additionally that "Files in other formats (including application files that may be used to manipulate text or picture files) may be included in an exchange set by private agreement between the producer and the receiver".** Additionally, clause 5.6.4 also mandates the use of TIF file formats for picture files, but states additionally "Files in other formats, provided through private agreements, should follow the same general naming convention and use the appropriate file extension to indicate their format".

Many Type Approved ECDIS's have been developed to accept only TIF files when generating the SENC as mandated in the ENC Product Specification. This has resulted in these ECDIS's failing to load picture files in formats other than .TIF.

When creating ENC exchange sets for general navigational distribution, picture files must be included **only in TIF (.TIF) format.**

### 22.109 Pilot district (PILDST)

**Pilot district:** IHO Definition: The area in which a particular pilotage service operates. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.163, November 2000).

### 22.110 Pilot district in national language (NPLDST)

**Pilot district in national language:** IHO Definition:

Indication: Pilot district (c...): String of national language characters.

Format: c...

Example:

Remarks:

- The attribute "pilot district in national language" encodes the pilot district for which a pilot station is responsible in the specified national language.

### 22.111 Product (PRODCT)

**Product:** IHO Definition:

1) **Oil**

IHO Definition: A thick, slippery liquid that will not dissolve in water, usually petroleum based in the context of storage tanks. (Adapted from the Oxford Minidictionary, Third Edition).

2) **Gas**

IHO Definition: A substance with particles that can move freely, usually a fuel substance in the context of storage tanks. (Adapted from the Oxford Minidictionary, Third Edition).

3) **Water**

IHO Definition: A colourless, odourless, tasteless liquid that is a compound of hydrogen and oxygen. (Adapted from the Oxford Minidictionary, Third Edition).

4) **Stone**

IHO Definition: A general term for rock fragments. (IHO Dictionary – S-32).

- 5) **Coal**  
IHO Definition: A hard black mineral that is burned as fuel. (Adapted from the Oxford Minidictionary, Third Edition).
- 6) **Ore**  
IHO Definition: A solid rock or mineral from which metal is obtained. (Adapted from the Oxford Minidictionary, Third Edition).
- 7) **Chemicals**  
IHO Definition: Any substance obtained by or used in a chemical process. (Adapted from the Oxford Minidictionary, Third Edition).
- 8) **Drinking water**  
IHO Definition: Water that is suitable for human consumption. (Adapted from the Oxford Minidictionary, Third Edition).
- 9) **Milk**  
IHO Definition: A white fluid secreted by female mammals as food for their young. (Adapted from the Oxford Minidictionary, Third Edition).
- 10) **Bauxite**  
IHO Definition: A mineral from which aluminum is obtained. (Adapted from the Oxford Minidictionary, Third Edition).
- 11) **Coke**  
IHO Definition: A solid substance obtained after gas and tar have been extracted from coal, used as a fuel. (Adapted from the Oxford Minidictionary, Third Edition).
- 12) **Iron ingots**  
IHO Definition: An oblong lump of cast iron metal. (Adapted from the Oxford Minidictionary, Third Edition).
- 13) **Salt**  
IHO Definition: Sodium chloride obtained from mines or by the evaporation of sea water. (Adapted from the Oxford Minidictionary, Third Edition).
- 14) **Sand**  
IHO Definition: Tiny grains of crushed or worn rock. (Adapted from the Oxford Minidictionary, Third Edition).
- 15) **Timber**  
IHO Definition: Wood prepared for use in building or carpentry. (Adapted from the Oxford Minidictionary, Third Edition).
- 16) **Sawdust/wood chips**  
IHO Definition: Powdery fragments of wood made in sawing timber or coarse chips produced for use in manufacturing pressed board. (Adapted from the Oxford Minidictionary, Third Edition).
- 17) **Scrap metal**  
IHO Definition: Discarded metal suitable for being reprocessed. (Adapted from the Oxford Minidictionary, Third Edition).
- 18) **Liquefied natural gas (LNG)**  
IHO Definition: Natural gas that has been liquefied for ease of transport by cooling the gas to -162 Celsius. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).
- 19) **Liquefied petroleum gas (LPG)**  
IHO Definition: A compressed gas consisting of flammable light hydrocarbons and derived from petroleum. (Adapted from the Websters ~~Third~~ New World Dictionary).
- 20) **Wine**  
IHO Definition: The ~~fermented~~ juice of grapes. (Adapted from the Websters New World Dictionary).



**21) Cement**

IHO Definition: A substance made of powdered lime and clay, mixed with water. (Adapted from the Websters New World Dictionary).

**22) Grain**

IHO Definition: A small hard seed, especially that of any cereal plant such as wheat, rice, corn, rye etc. (Adapted from the Websters New World Dictionary).

Remarks:

- The attribute “product” encodes the various substances which are transported, stored or exploited.

**22.112 Publication reference (PUBREF)**

**Publication reference:** IHO Definition: A reference to a nautical publication. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.168, November 2000).

Indication: The string encodes the reference to a specific paragraph from a nautical publication.

Example: **United States Coast Pilot No 1 1992 (27th) edition, Atlantic Coast, Eastport to Cape Cod, Chapter 3, Paragraph 2**

**22.113 Quality of sounding measurement (QUASOU)**

**Quality of sounding measurement:** IHO Definition:

**1) Depth known**

IHO Definition: The depth from the chart datum to the bottom (or to the top of a drying feature) is known. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

**2) Depth or least depth unknown**

IHO Definition: The depth from chart datum to the bottom, or the shoalest depth of the feature is unknown. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.169, November 2000, as amended).

**Comment [j184]:** MD8 – 4.Co.11.

**3) Doubtful sounding**

IHO Definition: A depth that may be less than indicated. (Adapted from IHO Dictionary – S-32).

**4) Unreliable sounding**

IHO Definition: A depth that is considered to be an unreliable value. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.169, November 2000).

**5) No bottom found at value shown**

IHO Definition: Upon investigation the bottom was not found at this depth. (Adapted from IHO Dictionary – S-32).

**6) Least depth known**

IHO Definition: The shoalest depth over a feature is of known value. (Adapted from IHO Dictionary – S-32).

**7) Least depth unknown, safe clearance at value shown**

IHO Definition: The least depth over a feature is unknown, but there is considered to be safe clearance at this depth. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.169, November 2000).

**8) Value reported (not surveyed)**

IHO Definition: Depth value obtained from a report, but not fully surveyed. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.169, November 2000).

**9) Value reported (not confirmed)**

IHO Definition: Depth value obtained from a report, which it has not been possible to confirm. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.169, November 2000).

**10) Maintained depth**

IHO Definition: The depth at which a channel is kept by human influence, usually by dredging. (IHO Dictionary – S-32).

**11) Not regularly maintained**

IHO Definition: Depths may be altered by human influence, but will not be routinely maintained. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.169, November 2000).

Remarks:

- The attribute “quality of sounding measurement” indicates the reliability of the value of sounding.

**22.114 Radar wave length (RADWAL)**

**Radar wave length:** IHO Definition: The distance between two successive peaks (or other points of identical phase) on an electromagnetic wave in the radar band of the electromagnetic spectrum. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.172, November 2000).

Indication: The wavelength and the band code character is indicated. In the case where two bands should be encoded, these should be separated by a comma.

Unit: Metre (m)

Resolution: 0.01m

Format: V.VV-B  
V.VV-B,V.VV.B

“VV.VV” encodes the value of wavelength;  
“B” encodes the band;  
each separated by a hyphen (“-”).

Example: The radar transponder beacon wavelength “3cm (X) – Band” is indicated as **0.03-X**.

Remarks:

- The attribute “radar transponder beacon wavelength” encodes the specific wavelength at which a radar transponder beacon transmits.
  - Radar transponder beacons generally work on the following wavelengths:
    - 3cm (X) - Band
    - 10cm (S) - Band
- Nevertheless, wavelengths outside the marine band are used.

**22.115 Radius (RADIUS)**

**Radius:** IHO Definition: The vector extending from the centre to the periphery of a circular or spherical object. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.173, November 2000).

Unit: Defined in the HUNI subfield of the CRSH record or the HUNITS attribute of the M\_UNIT meta feature: metre (m)

Resolution: 0.1m

Format: xxx.x

Example: **26** for a radius of 26 metres

**22.116 Recording date (RECDAT)**

**Recording date:** IHO Definition: The date when the specific object or cartographic primitive was captured, edited or deleted.

Indication: The source should be encoded using 4 digits for the calendar year (CCYY), 2 digits for the month (MM) and 2 digits for the day (DD), according to ISO 8601:1988.

Format: CCYYMMDD (full date, mandatory)

CCYYMM (no specific day required – **mandatory**)  
 CCYY (no specific month required – **mandatory**)

Example: 19930112 for 12 January 1993 as recording date.

**Comment [J185]:** MD8 – 4.Cl.10 and 4.Co.12. Should this be included for this attribute?

## 22.117 Recording indication (RECIND)

**Recording indication** IHO Definition: The procedure for the encoding and entering of data.

Indication:

Country (c2): (**mandatory**): Two letter code from ISO 3166 (refer to S-62)

Authority (c2): (**mandatory**): A string of two alphanumeric characters (refer to S-62), e.g. German Bundesamt für Seeschifffahrt und Hydrographie = DE; US National Imagery and Mapping Agency = U1.

Procedure (c4): Digitised = digi  
 Scanned = scan  
 Alpha/numeric input = alph

Format: c2,c2,c4 (**mandatory**)

Example: DK,D1,digi

## 22.118 Reference year of magnetic variation (RYRMGV)

**Reference year for magnetic variation:** IHO Definition: The reference calendar year for magnetic variation values. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.176, November 2000).

Unit: Four digit year indication (CCYY)

Format: CCYY

Example: 2009

## 22.119 Restriction (RESTRN)

**Restriction:** IHO Definition:

### 1) Anchoring prohibited

IHO Definition: An area within which anchoring is not permitted. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.177, November 2000).

### 2) Anchoring restricted

IHO Definition: A specified area designated by appropriate authority, within which anchoring is restricted in accordance with certain specified conditions. An area within which anchoring is not permitted. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.177, November 2000).

### 3) Fishing prohibited

IHO Definition: An area within which fishing is not permitted. An area within which anchoring is not permitted. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.177, November 2000).

### 4) Fishing restricted

IHO Definition: A specified area designated by appropriate authority, within which fishing is restricted in accordance with certain specified conditions. An area within which anchoring is not permitted. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.177, November 2000).

### 5) Trawling prohibited

IHO Definition: An area within which trawling is not permitted. An area within which anchoring is not permitted. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.177, November 2000).

### 6) Trawling restricted

**IHO Definition:** A specified area designated by appropriate authority, within which trawling is restricted in accordance with certain specified conditions. An area within which anchoring is not permitted. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.178, November 2000).

**7) Entry prohibited**

**IHO Definition:** An area within which navigation and/or anchoring is prohibited. (Adapted from IHO Dictionary – S-32).

**8) Entry restricted**

**IHO Definition:** A specified area designated by appropriate authority, within which navigation is restricted in accordance with certain specified conditions. (Adapted from IHO Dictionary – S-32).

**9) Dredging prohibited**

**IHO Definition:** An area within which dredging is not permitted. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.178, November 2000).

**10) Dredging restricted**

**IHO Definition:** A specified area designated by appropriate authority, within which dredging is restricted in accordance with certain specified conditions. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.178, November 2000).

**11) Diving prohibited**

**IHO Definition:** An area within which diving is not permitted. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.178, November 2000).

**12) Diving restricted**

**IHO Definition:** A specified area designated by appropriate authority, within which diving is restricted in accordance with certain specified conditions. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.178, November 2000).

**13) No wake**

**IHO Definition:** Mariners must adjust the speed of their vessels to reduce the wave or wash which may cause erosion or disturb moored vessels. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.178, November 2000).

**14) Area to be avoided**

**IHO Definition:** A routing measure comprising an area within defined limits in which either navigation is particularly hazardous or it is exceptionally important to avoid casualties and which should be avoided by all ships, or certain classes of ships. (IHO Dictionary – S-32).

**15) Construction prohibited**

**IHO Definition:** The erection of permanent or temporary fixed structures or artificial islands is prohibited. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.178, November 2000).

**16) Discharging prohibited**

**IHO Definition:** An area within which discharging or dumping is prohibited. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.178, November 2000).

**17) Discharging restricted**

**IHO Definition:** A specified area designated by an appropriate authority, within which discharging or dumping is restricted in accordance with specified conditions. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.178, November 2000).

**18) Industrial or mineral exploration/development prohibited**

**IHO Definition:** An area within which industrial or mineral exploration and development are prohibited. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.178, November 2000).

**19) Industrial or mineral exploration/development restricted**

**IHO Definition:** A specified area designated by an appropriate authority, within which industrial or mineral exploration and development is restricted in accordance with certain specified conditions. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.178, November 2000).

**20) Drilling prohibited**

IHO Definition: An area within which excavating a hole on the sea-bottom with a drill is prohibited. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.178, November 2000).

**21) Drilling restricted**

IHO Definition: A specified area designated by an appropriate authority, within which excavating a hole on the sea-bottom with a drill is restricted in accordance with certain specified conditions. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.178, November 2000).

**22) Removal of historical artefacts prohibited**

IHO Definition: An area within which the removal of historical artefacts is prohibited. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.178, November 2000).

**23) Cargo transhipment (lightening) prohibited**

IHO Definition: An area in which cargo transhipment (lightening) is prohibited. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.178, November 2000).

**24) Dragging prohibited**

IHO Definition: An area in which the dragging of anything along the bottom, e.g. bottom trawling, is prohibited. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.178, November 2000).

**25) Stopping prohibited**

IHO Definition: An area in which a vessel is prohibited from stopping. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.178, November 2000).

**26) Landing prohibited**

IHO Definition: An area in which landing is prohibited. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.179, November 2000).

**27) Speed restricted**

IHO Definition: An area within which speed is restricted. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.179, November 2000).

**28) Swimming prohibited**

IHO Definition: An area in which swimming is prohibited: |

**Comment [j186]:** S-57  
Extension 06/01.

**Remarks:**

- The official legal status of each kind of restricted area defines the kind of restriction(s), e.g. the restriction for a “game preserve” may be “entry prohibited”, the restriction for an “fish sanctuary” may be “fishing restricted”.
- The complete information about the restriction(s), actually held in handbooks or other publications, may be encoded by the attribute **textual description**. A short explanation may be given by the use of the attribute **information**.

**22.120 Scale minimum (SCAMIN)**

**Scale minimum:** IHO Definition: The minimum scale at which the feature may be used e.g. for ECDIS presentation.

Minimum value: 1

Indication: The modulus of the scale is indicated, that is 1:1 250 000 is encoded as 1250000.

Unit: None

Resolution: 1

Format: xxxxxxxx

Example: If a particular minimum scale is specified as 1:89 999 (encoded as **89999**), and an example of a smaller scale would be 1:179 999 (encoded as **179999**).

The **scale minimum** value of a **feature** determines the display scale below which the **feature** is no longer displayed. Its purpose is to reduce clutter, to prioritise the display of **features** and to improve display speed. In

encoding its value, the producing authority should consider these factors, as well as the scale at which the **feature** is no longer likely to be required for navigation.

In order to optimise the performance and clarity of the ENC, it is a **mandatory requirement on ENCs that scale minimum is used**.

Remarks:

- **scale minimum** only affects the display of a **feature** on an ECDIS, not its presence in the SENC.
- If **scale minimum** is not encoded, the **feature** is displayed at all scales.
- Where **scale minimum** is used, it must always be set to a scale less (i.e. to a smaller scale) than or equal to the **maximum display scale** of the data as described in clause X.X. Failure to follow this rule will mean that **features** will not be displayed on the ECDIS until the overscale warning is activated.
- Group 1 and Meta **features** must always be displayed. Therefore, **scale minimum** must not be encoded on Group 1 and Meta **features**.
- If the same **feature** exists in **datasets** of different **maximum display scale s**, the same **scale minimum** value **must** be assigned to each occurrence of the **feature**.

### 22.120.1 Sample scale minimum policy

The following policy for the application of **scale minimum** to an ENC portfolio is based on the **mandatory** ENC cell compilation scales recommended in clause X.X. While the procedure described below to determine the **scale minimum** value for **features** in an ENC cell is recommended, the SCAMIN values used are at the discretion of the Producing Authority. Authorities should cooperate at the regional or RENC level to determine a **scale minimum** policy that results in suitable and consistent display of ENC data for the mariner across and, where required between, regions.

**scale minimum** values used **must** be selected from the following list:

19999999
9999999
4999999
2999999
1499999
999999
699999
499999
349999
259999
179999
119999
89999
59999
44999
29999
21999
17999
11999
7999
3999
1999
999

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

- The table below lists the step values (i.e. 1, 2, 3 or 4) that may be applied for specific feature classes together with any relevant conditions and additional flexibilities.

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

Unless the step values outlined in the table have been manually adjusted, this approach takes no direct account of the relative importance of individual occurrences of a feature, and may result in the situation where a feature disappears and then reappears as the user zooms out on their ECDIS display. To address these remaining issues, the following additional process steps should be applied:

- Linear and area features (excluding those features subject to extensive generalisation e.g. **Depth Contour**) that extend beyond the coverage of a dataset and exist in an overlapping smaller scale dataset should be assigned the same **scale minimum** value as the **scale minimum** value of the corresponding feature in the smaller scale dataset.
- The **scale minimum** value of an individual occurrence of a feature should be set to either 1, 2, 3 or 4 steps smaller scale than the compilation scale of the smallest scale ENC that the feature would appear on (i.e. assuming full coverage across all compilation scales).

The following notes apply to the table below:

1. Producers should be prepared to deviate from the step values specified when the significance of the feature dictates, e.g. the recommended number of steps for a **Light feature** is 4, but there will be circumstances where a **Light feature** is so important that no **scale minimum** value be applied; alternatively, the light could be so minor that a step value of 1 can be applied.
2. **scale minimum** should only be applied to navigational aids where they contribute to “screen clutter” and where their removal from the display does not constitute a risk to safe navigation.
3. It is generally accepted that features making up a navigational aid will have the same attributes, and therefore those with Master/Slave relationships should be assigned the same **scale minimum** value.

FEATURE	PRIMITIVE	CONDITION	scale minimum STEPS
Anchorage Area	Point/Surface		2
Anchor Berth	Point/Surface	If restriction defined	3
Anchor Berth	Point/Surface		1
Administration Area	Surface		3
Airport/Airfield	Point/Surface	If visually conspicuous = True	3
Airport/Airfield	Point/Surface		1
Archipelagic Sea Lane	Curve/Surface		4
Beacon Cardinal	Point		3 (see Notes 2 & 3 above)
Beacon Isolated Danger	Point		4 (see Notes 2 & 3 above)
Beacon Lateral	Point		3 (see Notes 2 & 3 above)
Beacon Safe Water	Point		3 (see Notes 2 & 3 above)
Beacon Special Purpose	Point		3 (see Notes 2 & 3 above)
Berth	Point/Curve/Surface		1
Bridge	Point/Curve/Surface	Covered by an surface Depth Area, Dredged Area, or Unsurveyed Area feature	4
Bridge	Point/Curve/Surface	If visually conspicuous = True or radar conspicuous = True and covered by a surface Land Area	3
Bridge	Point/Curve/Surface	Covered by an surface Land Area	1
Buoy Cardinal	Point		3 (see Notes 2 & 3 above)

FEATURE	PRIMITIVE	CONDITION	scale minimum STEPS
Buoy Installation	Point		3 (see Notes 2 & 3 above)
Buoy Isolated Danger	Point		4 (see Notes 2 & 3 above)
Buoy Lateral	Point		3 (see Notes 2 & 3 above)
Buoy Safe Water	Point		3 (see Notes 2 & 3 above)
Buoy Special Purpose	Point		3 (see Notes 2 & 3 above)
Building	Point/Surface	If <b>visually conspicuous</b> = <b>True</b> or <b>radar conspicuous</b> = <b>True</b> or <b>function</b> = 33 (light support)	3
Building	Point/Surface		1
Built-up Area	Point/Surface	If <b>visually conspicuous</b> = <b>True</b> or <b>radar conspicuous</b> = <b>True</b>	3
Built-up Area	Point/Surface		1
C_AGGR	N/A		NOT SET
C ASSO	N/A		NOT SET
Cable Area	Surface	If restriction defined	3
Cable Area	Surface		2
Cable Overhead	Curve	Covered by an area <b>Depth Area</b> , <b>Dredged Area</b> , or <b>Unsurveyed Area</b> <b>feature</b>	4
Cable Overhead	Curve	If <b>visually conspicuous</b> = <b>True</b> or <b>radar conspicuous</b> = <b>True</b>	3
Cable Overhead	Curve		1
Cable Submarine	Curve		3
Canal	Curve		1
Canal	Surface		4
Cargo Transshipment Area	Point/Surface		1
Causeway	Curve/Surface		2
Caution Area	Point/Surface		4
Checkpoint	Point/Surface		1
Coastguard Station	Point		1
Coastline	Curve		NOT SET
Contiguous Zone	Surface		3
Continental Shelf Area	Surface		3
Control Point	Point		1
Conveyor	Curve/Surface	Covered by an <b>surface</b> <b>Depth Area</b> , <b>Dredged Area</b> , or <b>Unsurveyed Area</b> <b>feature</b>	4
Conveyor	Curve/Surface	If <b>visually conspicuous</b> = <b>True</b> or <b>radar conspicuous</b> = <b>True</b>	3
Conveyor	Curve/Surface		1
Crane	Point/Surface	If <b>visually conspicuous</b> = <b>True</b> or <b>radar conspicuous</b> = <b>True</b>	3
Crane	Point/Surface		1
Current – Non-navigational	Point		3
Custom Zone	Surface		2
Dam	Point/Curve/Surface		1



FEATURE	PRIMITIVE	CONDITION	scale minimum STEPS
Dam	Curve/Surface	If seaward edge is coincident with the coastline (see clause X.X)	NOT SET
Dam	Curve/Surface	If visually conspicuous = True or radar conspicuous = True	3
Daymark	Point	If Slave scale minimum must match that of Master	3
Deep Water Route Centreline	Curve		NOT SET
Deep Water Route Part	Surface		NOT SET
Depth Area	Surface		NOT SET
Depth Contour	Curve	If value of depth contour = 0 (drying line) or 30 (default safety contour ref S-52)	4
Depth Contour	Curve		2
Distance Mark	Point		2
Dock Area	Surface		1
Dredged Area	Surface		NOT SET
Dry Dock	Surface		1
Dumping Ground	Point/Surface	If restriction defined	3
Dumping Ground	Point/Surface		2
Dyke	Curve/Surface	If seaward edge is coincident with the coastline (see clause X.X)	NOT SET
Dyke	Curve		1
Exclusive Economic Zone	Surface		3
Fairway	Surface		3
Fenceline	Curve	If visually conspicuous = True or radar conspicuous = True	3
Fenceline	Curve		1
Ferry Route	Curve/Surface		3
Fishery Zone	Surface		3
Fishing Facility	Point/Curve/Surface		2
Fishing Ground	Surface		1
Floating Dock	Point/Curve	If visually conspicuous = True or radar conspicuous = True	3
Floating Dock	Surface		NOT SET
Fog Signal	Point	If Slave scale minimum must match that of Master	3
Fortified Structure	Point/Curve/Surface	If visually conspicuous = True or radar conspicuous = True	3
Fortified Structure	Point/Curve/Surface		1
Free Port Area	Surface		2
Gate	Point/Curve/Surface		2
Gate	Point/Curve/Surface	Covered by an surface Depth Area, Dredged Area, or Unsurveyed Area feature	NOT SET
Gridiron	Point/Surface		1
Harbour Area	Surface		3
Harbour Facility	Point/Surface		1
Hulk	Point		1
Hulk	Point	If visually conspicuous = True or radar conspicuous = True	3
Hulk	Surface		NOT SET

FEATURE	PRIMITIVE	CONDITION	scale minimum STEPS
Ice Area	Surface		3
Incineration Area	Point/Surface		1
Incineration Area	Point/Surface	If restriction defined	3
Inshore Traffic Zone	Surface		NOT SET
Lake Area	Surface		1
Land Area	Point/Curve/Surface		NOT SET
Land Elevation	Point	If visually conspicuous = True	3
Land Elevation	Point/Curve		1
Land Region	Point/Surface		1
Landmark	Point/Curve/Surface	If visually conspicuous = True or radar conspicuous = True or function = 33 (light support)	3
Landmark	Point/Curve/Surface		1
Light	Point	If Slave scale minimum must match that of Master	4 (see Notes 2 & 3 above)
Light Float	Point		4 (see Notes 2 & 3 above)
Light Vessel	Point		4 (see Notes 2 & 3 above)
Local Magnetic Variation	Point/Curve/Surface		3
Lock Basin	Surface		1
Log Pond	Point/Surface	Covered by an surface Depth Area, Dredged Area, or Unsurveyed Area feature	4
Log Pond	Point/Surface		1
Magnetic Variation	Point/Curve/Surface		1
Marine Farm/Culture	Point/Curve/Surface	If exposition of sounding = 2 (shoaler than range of the surrounding depth area) and value of sounding ≤ 30	4
Marine Farm/Culture	Point/Curve/Surface	If restriction defined	3
Marine Farm/Culture	Point/Curve/Surface		1
Military Practice Area	Point/Surface		3
Mooring/Warping Facility	Point/Curve/Surface	If visually conspicuous = True or radar conspicuous = True	3
Mooring/Warping Facility	Point/Curve/Surface		2
Navigation Line	Curve		3
Obstruction	Point/Curve/Surface		NOT SET
Obstruction	Point/Curve/Surface	If value of sounding > 30 and exposition of sounding ≠ 2 (shoaler than range of the surrounding depth area)	4
Offshore Platform	Point	Not covered by a surface Offshore Production Area	4
Offshore Platform	Point/Surface		3
Offshore Platform	Surface		4
Offshore Production Area	Surface		4
Oil Barrier	Curve		4
Pile	Point	Where used to mark position of Light feature in water	4 (see Note 3 above)
Pile	Point/Curve	If visually conspicuous = True	3
Pile	Point		2

FEATURE	PRIMITIVE	CONDITION	scale minimum STEPS
Pilot Boarding Place	Point/Surface		3
Pingo	Point/Surface		4
Pipeline Area	Point/Surface		3
Pipeline Overhead	Curve	Covered by a surface Depth Area, Dredged Area, or Unsurveyed Area feature	4
Pipeline Overhead	Curve	If visually conspicuous = True or radar conspicuous = True	3
Pipeline Overhead	Curve		1
Pipeline Submarine/On Land	Point/Curve	Covered by a surface Depth Area, Dredged Area, or Unsurveyed Area feature	3
Pipeline Submarine/On Land	Point	Covered by a surface Land Area feature	1
Pontoon	Point/Curve		2
Pontoon	Point/Curve	If visually conspicuous = True or radar conspicuous = True	3
Pontoon	Surface		4
Precautionary Area	Point/Surface		NOT SET
Production Area	Point/Surface	If visually conspicuous = True or radar conspicuous = True	3
Production Area	Point/Surface		1
Pylon/Bridge Support	Point/Surface	Covered by a surface Depth Area, Dredged Area, or Unsurveyed Area feature	NOT SET
Pylon/Bridge Support	Point/Surface	If visually conspicuous = True or radar conspicuous = True	3
Pylon/Bridge Support	Point/Surface		1
Radar Line	Curve		3
Radar Range	Surface		3
Radar Reflector	Point	If Slave scale minimum must match that of Master	3
Radar Station	Point	If Slave scale minimum must match that of Master	2
Radar Transponder Beacon	Point	If Slave scale minimum must match that of Master	3
Radio Calling-in Point	Point/Curve		3
Radio Station	Point	If Slave scale minimum must match that of Master	1
Railway	Curve		1
Rapid	Point/Curve/Surface		1
Recommended Route Centreline	Curve		3
Recommended Track	Curve/Surface		3
Recommended Traffic Lane Part	Point/Surface		3
Rescue Station	Point		3
Restricted Area	Surface		3
Retroreflector	Point	If Slave scale minimum must match that of Master	3
River	Curve		1
River	Surface		4
Road	Point/Curve/Surface		1
Runway	Point/Curve/Surface	If visually conspicuous = True	3
Runway	Point/Curve/Surface		1
Sandwave	Point/Curve/Surface		3
Sea Area	Point/Surface		1

FEATURE	PRIMITIVE	CONDITION	scale minimum STEPS
Seabed Area	Point/Curve/Surface		1
Seaplane Landing Area	Point/Surface	If restriction defined	3
Seaplane Landing Area	Point/Surface		1
Shoreline Construction	Point/Curve/Surface		NOT SET
Signal Station Traffic	Point	If Slave scale minimum must match that of Master	1
Signal Station Warning	Point	If Slave scale minimum must match that of Master	1
Silo/Tank	Point/Surface	If visually conspicuous = True or radar conspicuous = True	3
Silo/Tank	Point/Surface		1
Slope Topline	Curve	If visually conspicuous = True or radar conspicuous = True	3
Slope Topline	Curve		1
Sloping Ground	Point/Surface	If visually conspicuous = True or radar conspicuous = True	3
Sloping Ground	Point/Surface		1
Small Craft Facility	Point/Surface		1
Sounding	Point		1
Span	Curve/Surface		NOT SET
Spring	Point		1
Submarine Transit Lane	Curve		3
Submarine Transit Lane	Surface		3
Swept Area	Surface		3
Territorial Sea Area	Surface		3
Tidal Stream – Flood/Ebb	Point/Surface		3
Tidal Stream Panel Data	Point/Surface		2
Tidal Stream – Harmonic Prediction	Point/Surface		2
Tidal Stream – Non-harmonic Prediction	Point/Surface		2
Tidal Stream – Time Series	Point/Surface		2
Tide – Harmonic prediction	Point/Surface		1
Tide – Non-harmonic Prediction	Point/Surface		1
Tide – Time Series	Point/Surface		1
Tideway	Curve/Surface		1
Topmark	Point	If Slave scale minimum must match that of Master	3
Traffic Separation Line	Curve/Surface		NOT SET
Traffic Separation Scheme Boundary	Curve		NOT SET
Traffic Separation Scheme Crossing	Surface		NOT SET
Traffic Separation Scheme Lane Part	Surface		NOT SET
Traffic Separation Scheme Roundabout	Surface Area		NOT SET
Traffic Separation Zone	Surface		NOT SET
Tunnel	Curve/Surface	Covered by a surface Depth Area, Dredged Area, or Unsurveyed Area feature	4

FEATURE	PRIMITIVE	CONDITION	scale minimum STEPS
Tunnel	Curve/Surface	Covered by a Land Area feature	1
Two-way Route Part	Surface		NOT SET
Underwater/Awash Rock	Point		NOT SET
Underwater/Awash Rock	Point	If value of sounding > 30 and exposition of sounding ≠ 2 (shoaler than range of the surrounding depth area)	4
Underwater/Awash Rock	Point	Covered by an surface Obstruction feature	2
Unsurveyed Area	Surface		NOT SET
Vegetation	Point/Curve/Surface	If visually conspicuous = True	3
Vegetation	Point/Curve/Surface		1
Water Turbulence	Point/Curve/Surface		3
Waterfall	Point/Curve	If visually conspicuous = True	3
Waterfall	Point/Curve		1
Weed/Kelp	Point/Surface		3
Wreck	Point/Surface		NOT SET
Wreck	Point/Surface	If category of wreck = 1 or (value of sounding > 30 and exposition of sounding ≠ 2 (shoaler than range of the surrounding depth area))	3
Wreck	Point/Surface	If visually conspicuous = True or radar conspicuous = True	3
Quality of Non-bathymetric Data	Surface		NOT SET
Compilation-Scale-of-Data	Surface		NOT SET
Data Coverage	Surface		NOT SET
Horizontal Datum Shift Parameters	Surface		NOT SET
Nautical Publication Information	Surface		NOT SET
Navigational System of marks	Surface		NOT SET
Quality of Bathymetric Data	Surface		NOT SET
Sounding Datum	Surface		NOT SET
Quality of Survey	Surface		NOT SET
Vertical Datum of Data	Surface		NOT SET

Optional additional rules that can be manually applied to fine tune the application of **scale minimum** after the above values have been automatically applied.

FEATURE	PRIMITIVE	CONDITION	scale minimum STEPS
Obstruction	Point	The most significant Obstruction of a group of Obstructions within close proximity	NOT SET
Obstruction	Point	For groups of Obstructions in close proximity, or within an Obstruction surface	2
Sounding	Point	scale minimum should be applied so that the least significant soundings are set to 1 step progressing to 4 steps for the most significant, above the compilation scale in order to achieve a gradual reduction in the sounding displayed as the user zooms out.	1, 2, 3, 4
Underwater/Awash Rock	Point	The most significant Underwater/Awash Rock of a group of Underwater/Awash Rocks within close proximity and not within an Obstruction surface	NOT SET
Wreck	Point/Surface	For groups of Wreck in close proximity (the most significant should not have scale minimum)	2

### 22.121 Sector limit one (SECTR1)

**Sector limit one:** IHO Definition: A sector is the part of a circle between two straight lines drawn from the centre to the circumference. (Advanced Learner's Dictionary, 2nd Edition).

Sector limit 1 specifies the first limit of the sector. The order of sector limit 1 and sector limit 2 is clockwise around the central object (e.g. a light). (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.184, November 2000).

Unit: Degree (°)

Resolution: 0.01°

Format: xxx.xx

Example: 125 for a sector orientation of 125 degrees

Remarks:

- The values given to the common limits of adjacent sectors should be identical.
- The orientation of bearing is from seaward to the central object. This conforms with the method used in "List of Lights" publications.
- A generic term such as "to shore" cannot be used; a specific bearing must be encoded. Where a light sector limit is defined as "to the shore", it should be encoded using a value that ensures that, when the limit is drawn, it will fall entirely on land.

### 22.122 Sector limit two (SECTR2)

**Sector limit two:** IHO Definition: A sector is the part of a circle between two straight lines drawn from the centre to the circumference. (Advanced Learner's Dictionary, 2nd Edition).

Sector limit 2 specifies the second limit of the sector. The order of sector limit 1 and sector limit 2 is clockwise around the central object (e.g. a light). (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.185, November 2000).

Unit: Degree (°)

Resolution: 0.01°

Format: xxx.xx

Example: 220 for a sector orientation of 220 degrees

Remarks:

- The values given to the common limits of adjacent sectors should be identical.
- The orientation of bearing is from seaward to the central object. This conforms with the method used in "List of Lights" publications.
- A generic term such as "to shore" cannot be used; a specific bearing must be encoded. Where a light sector limit is defined as "to the shore", it should be encoded using a value that ensures that, when the limit is drawn, it will fall entirely on land.

### 22.123 Signal frequency (SIGFRQ)

**Signal frequency:** IHO Definition: The frequency of a signal. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.187, November 2000).

Unit: Hertz (Hz)

Resolution: 1 Hz

Format: xxxxxxxxxxxx

Example: 950000000 for a radio signal centred on 950 MHz

**Comment [j187]:** MD8 – 2.Cl.7 and 2.Co.6.

### 22.124 Signal generation (SIGGEN)

**Signal generation:** IHO Definition: The mechanism used to generate a fog signal.

1) **Automatically**

**IHO Definition:** Signal generation is initiated by a self regulating mechanism such as a timer or light sensor. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.188, November 2000).

2) **By wave action**

**IHO Definition:** The signal is generated by the motion of the sea surface such as a bell in a buoy. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.188, November 2000).

3) **By hand**

**IHO Definition:** The signal is generated by a manually operated mechanism such as a hand. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.188, November 2000).  
cranked siren.

4) **By wind**

**IHO Definition:** The signal is generated by the motion of air such as a wind driven whistle. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.188, November 2000).

**Remarks:**

- The attribute "signal generation" encodes the mechanism used to generate a fog signal.

**22.125 Signal group (SIGGRP)**

**Signal group:** **IHO Definition:** The number of signals, the combination of signals or the Morse character(s) within one period of full sequence. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.189, November 2000).

**Indication:** The signal group of a light is encoded using brackets to separate the individual groups. A group of signals may be a single number, a chain of numbers separated by "+", a sequence of up to 4 letters or a letter and a number.

A fixed light has no signal group.

Where no specific signal group is given for one of the light characteristics, this should be shown by an empty pair of brackets.

**Format:** (c)(c)...

**Examples:**

light characteristic	signal group	Indication
VQ(6)+LFI	->	(6)(1)
LFI+FI(2+3)	->	(1)(2+3)
FI(2)+LFI	->	(2)(1)
FFI	->	()(1)
Mo(AA)	->	(AA)
AlFI(2W+1R)	->	(2+1)
AlLFIWR	->	(1)
FOcW	->	()(1)
AlOc(4)WR	->	(4)
AlWR	->	()
Iso	->	(1)
IQ	->	()L

**Comment [j188]:** MD8 – 8.CL10 and 8.Co.8.

**Comment [j189]:** MD8 – 8.CL6 and 8.Co.7).

**22.126 Signal period (SIGPER)**

**Signal period:** **IHO Definition:** The time occupied by an entire cycle of intervals of light and eclipse. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.190, November 2000).

**Unit:** Seconds (s)

**Resolution:** 0.01s

**Format:** xx.xx

Minimum value:  $\geq 0$   
Example: 12 for an interval of 12 seconds

**Comment [j190]:** MD8 – 7.Co.19.

## 22.127 Signal sequence (SIGSEQ)

**Signal sequence:** IHO Definition: The sequence of times occupied by intervals of light and eclipse for all "light characteristics" except for occulting where the sequence of times is occupied by intervals of eclipse and light. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.191, November 2000).

Unit: Seconds (s)

Resolution: 0.01s

Format (all non-fixed "light characteristics" except occulting):

LL.LL+(EE.EE)

Example:

00.80+(02.20)+00.80+(05.20)

The above example encodes a signal sequence for a flashing light with two intervals of light (L) and two intervals of eclipse (E). **Note:** the above example has a signal group of (2) and a signal period of 9 seconds.

Format (occulting):

(EE.EE)+LL.LL

Example:

(00.80)+02.20+(00.80)+05.20

The above example encodes a signal sequence for an occulting light with two intervals of eclipse (E) and two intervals of light (L). **Note:** the above example has a signal group of (2) and a signal period of 9 seconds.

Remarks:

- The "signal sequence" for all "light characteristics" except for occulting is indicated using a fixed format to encode the value of intervals of light (L) and eclipse (E). For occulting lights, the "signal sequence" is indicated using a fixed format to encode the values of intervals of eclipse (E) and light (L).

**Comment [j191]:** MD8 – 5.Co.5.

**Comment [j192]:** MD8 – 5.Co.5.

**Comment [j193]:** MD8 – 5.Co.5.

**Comment [j194]:** MD8 – 5.Co.5.

**Comment [j195]:** MD8 – 2.Cl.8

## 22.128 Status (STATUS)

**Status:** IHO Definition:

### 1) Permanent

IHO Definition: Intended to last or function indefinitely. (The Concise Oxford Dictionary, 7<sup>th</sup> Edition).

### 2) Occasional

IHO Definition: Acting on special occasions; happening irregularly. (The Concise Oxford Dictionary, 7<sup>th</sup> Edition).

### 3) Recommended

IHO Definition: Presented as worthy of confidence, acceptance, use, etc. (The Macquarie Dictionary, 1988).

### 4) Not in use

IHO Definition: Use has ceased, but the facility still exists intact; disused. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

### 5) Periodic/intermittent

IHO Definition: Recurring at intervals. (The Concise Oxford Dictionary, 7<sup>th</sup> Edition).

### 6) Reserved

IHO Definition: Set apart for some specific use. (Adapted from The Concise Oxford Dictionary, 7<sup>th</sup> Edition).



- 7) **Temporary**  
IHO Definition: Meant to last only for a time. (The Concise Oxford Dictionary).
- 8) **Private**  
IHO Definition: Administered by an individual or corporation, rather than a State or a public body. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).
- 9) **Mandatory**  
IHO Definition: Compulsory; enforced. (The Concise Oxford Dictionary, 7th Edition).
- 11) **Extinguished**  
IHO Definition: No longer lit. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.197, November 2000).
- 12) **Illuminated**  
IHO Definition: Lit by floodlights, strip lights, etc. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.198, November 2000).
- 13) **Historic**  
IHO Definition: Famous in history; of historical interest. (The Concise Oxford Dictionary, 7<sup>th</sup> Edition).
- 14) **Public**  
IHO Definition: Belonging to, available to, used or shared by, the community as a whole and not restricted to private use. (Adapted from The New Shorter Oxford English Dictionary, 1993).
- 15) **Synchronised**  
IHO Definition: Occur at a time, coincide in point of time, be contemporary or simultaneous. (The New Shorter Oxford English Dictionary, 1993).
- 16) **Watched**  
IHO Definition: Looked at or observed over a period of time especially so as to be aware of any movement or change. (adapted from The New Shorter Oxford English Dictionary, 1993).
- 17) **Un-watched**  
IHO Definition: Usually automatic in operation, without any permanently-stationed personnel to superintend it. (Adapted from IHO Dictionary – S-32).
- 18) **Existence doubtful**  
IHO Definition: An object that has been reported but has not been definitely determined to exist. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.198, November 2000).
- 19) **Buoyed**  
IHO Definition: Marked by buoys. (Australian Hydrographic Service).

## 22.129 Technique of sounding measurement (TECSOU)

**Technique of sounding measurement:** IHO Definition:

- 1) **Found by echo-sounder**  
IHO Definition: The depth was measured by using an instrument that determines depth of water by measuring the time interval between emission of a sonic or ultrasonic signal and return of its echo from the bottom. (Adapted from IHO Dictionary – S-32).
- 2) **Found by side scan sonar**  
IHO Definition: The depth was computed from a record produced by active sonar in which fixed acoustic beams are directed into the water perpendicularly to the direction of travel to scan the bottom and generate a record of the bottom configuration. (Adapted from IHO Dictionary – S-32).
- 3) **Found by multi-beam**  
IHO Definition: The depth was measured by using a wide swath echo sounder that uses multiple beams to

measure depths directly below and transverse to the ship's track. (Adapted from IHO Dictionary – S-32).

4) **Found by diver**

IHO Definition: The depth was **measured** by a person skilled in the practice of diving. (Adapted from IHO Dictionary – S-32).

5) **Found by lead-line**

IHO Definition: The depth was **measured** by using a line, graduated with attached marks and fastened to a sounding lead. (Adapted from IHO Dictionary – S-32).

6) **Swept by wire-drag**

IHO Definition: The given area was determined to be free from navigational dangers to a certain depth by towing a buoyed wire at the desired depth by two launches, or a least depth was identified using the same technique. (Adapted from IHO Dictionary – S-32).

7) **Found by laser**

IHO Definition: The depth was **measured** by using an instrument that measures distance by emitting timed pulses of laser light and measuring the time between emission and reception of the reflected pulses. (Adapted from IHO Dictionary – S-32).

8) **Swept by vertical acoustic system**

IHO Definition: The given area has been swept using a system comprised of multiple echo sounder transducers attached to booms deployed from the survey vessel. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.207, November 2000).

9) **Found by electromagnetic sensor**

IHO Definition: The depth was **measured** by using an instrument that compares electromagnetic signals. (Adapted from IHO Dictionary – S-32).

10) **Photogrammetry**

IHO Definition: The depth was determined by applying mathematical techniques to photographs. (Adapted from IHO Dictionary – S-32).

11) **Satellite imagery**

IHO Definition: The depth was determined by using instruments placed aboard an artificial satellite. (Adapted from IHO Dictionary – S-32).

12) **Found by levelling**

IHO Definition: The depth was **measured** by using levelling techniques to find the elevation of the point relative to a datum. (Adapted from IHO Dictionary – S-32).

13) **Swept by side-scan sonar**

IHO Definition: The given area was determined to be free from navigational dangers to a certain depth by towing a side-scan-sonar. (Adapted from IHO Dictionary – S-32).

14) **Computer generated**

IHO Definition: The sounding was determined from a bottom model constructed using a computer. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.207, November 2000).

## 22.130 Textual description (TXTDSC)

**Textual description:** IHO Definition:

Indication: The string encodes the file name of an external text file that contains the text in English.

Remarks:

- The attribute "textual description" indicates that a file containing text extracted from relevant pilot books or **nautical** publications is available.
- The attribute is generally used for long text strings or those that require formatting, however, there is no restriction on the type of text (except for lexical level) that can be held in files referenced by **textual**

**description.**

**Comment [j196]:** MD8 – 1.Cl.22 and 1.Co.15.

### 22.131 Textual description in national language (NXTDTS)

**Textual description in national language:** IHO Definition:

Indication: The string encodes the file name of an external text file that contains the text in a national language.

Remarks:

- The attribute is generally used for long text strings or those that require formatting, however, there is no restriction on the type of text (except for lexical level) that can be held in files referenced by **textual description in national language**.

**Comment [j197]:** MD8 – 1.Cl.24 and 1.Co.17.

### 22.132 Tidal stream – panel values (TS\_TSP)

**Tidal stream – panel values:** IHO Definition:

Indication: The direction in degrees and velocity in knots are encoded in pairs. Each value separated by a comma

Example:

63230,Darwin,HW,124,2.2,128,2.1,125,2.9,116,2.8,110,2.0,095,0.6,020,0.2,320,1.9,315,2.1,300,2.8,268,2.6,200,;

Remarks:

- The attribute “Tidal stream - panel values” encodes the identification of the reference station with reference and the direction of the flow and the springs rate from 6 hours before to 6 hours after high water (HW) or low water the reference station, at hourly intervals.
- The intention of this formatted attribute is to provide the ECDIS with the required standard format to enable the of a paper chart tide stream panel in tabular format to be viewed on the ECDIS display.
- Where a rate is 0.0, the associated (preceding) value for the direction of flow cannot have a direction. In such place in the list must be left empty and a delimiting comma must be encoded, i.e. ...,0.0,... Similarly, values that are unknown must also be left empty.
- The relationship to a reference station is encoded using a **collection feature**.

### 22.133 Tidal stream, current – time series values (TS\_TSV)

**Tidal stream, current – time series values:** IHO Definition:

Indication: The direction in degrees and velocity in knots are encoded in pairs. Each value separated by a comma.

Example: 135,1.5,156,1.9,301,1.1,342,0.9

Remarks:

- The attribute “Tidal stream, current - time series values” encodes values for a direction and velocity time series.

### 22.134 Tide – accuracy of water level (T\_ACWL)

**Tide – accuracy of water level:** IHO Definition:

1) **Better than 0.1m and 10 minutes**

2) **Worse than 0.1m and 10 minutes**

Remarks:

- The attribute “Tide - accuracy of water level” encodes the accuracy of the water level, to the confidence level of 95%.

### 22.135 Tide – high and low water values (T\_HWLW)

**Tide – high and low water values:** IHO Definition:

Indication: Dates/times and heights are to be encoded in pairs, each value separated by a comma.

The date/time **must** be encoded using 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD), separated by a capital "T" from the hour (hh) and minutes (mm) which **must** each be encoded using 2 digits. This conforms to ISO 8601:1988. Seconds should not be used.

The height **must** be given in metres (xx.x) with a resolution of 0.1 metre.

Format: CCYYMMDDThhmm,xx.x,CCYYMMDDThhmm,xx.x

Example: 20130428T1020,1.2,20130428T1455,4.8,...

Remarks:

- The attribute "tide - high and low water values" encodes information on the times and heights of high and low waters for each day of the duration of the time series.

### 22.136 Tide – method of tidal prediction (T\_MTOD)

**Tide – method of tidal prediction:** IHO Definition:

1) **Simplified harmonic method of tidal prediction**

IHO Definition: Prediction of tidal heights by combining a simplified set of harmonic constituents into a single time/height curve. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.214, November 2000).

2) **Full harmonic method of tidal prediction**

IHO Definition: Prediction of tidal heights by combining a complete set of harmonic constituents into a single time/height curve. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.214, November 2000).

3) **Time and height difference non-harmonic method**

IHO Definition: Prediction of high and low water times and heights by modification of the high and low water times and heights of a known time/height curve. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.214, November 2000).

Remarks:

- The attribute "Tide - method of tidal prediction" encodes the various methods of tidal prediction.

### 22.137 Tide – time and height differences (T\_THDF)

**Tide – time and height differences:** IHO Definition:

Indication:

Time difference in hours and minutes: ± hhmm (according to ISO 8106: 1988)

Height difference: metres (preceded with "-" if negative value)

Rate difference: knots (preceded with "-" if negative value)

Example:

Tidal height: 63230,Darwin,-0040,-0.7,0.9

Tidal stream: 59060,Cairns,+0130,1.2,-0.7

Remarks:

- The attribute "tide - time and height differences" encodes the time and tidal height or tidal stream rate difference comparative to a reference station.
- The format is the same for tides and tidal streams, with height difference being replaced by rate difference. The relation to a reference station is encoded by the use of a collection feature.
- The attribute is used to contain the identification of the reference station and, encoded in triplets, mean time difference (+ or -), height or rate difference for mean high water or mean high rate (preceded with "-" if negative value), height or rate difference for mean low water or mean low rate (preceded with "-" if negative value), each

value separated by a comma.

### 22.138 Tide – time series values (T\_TSVL)

**Tide – time series values:** IHO Definition:

Indication: The height above or below (-ve) datum. Each value separated by a comma.

Example: 0.2,0.1,0.0,-0.1,-0.2,-0.1,0.0,0.1

Remarks:

- The attribute "tide - time series values" encodes the values of a time series.

### 22.139 Tide – value of harmonic constituents (T\_VAHC)

**Tide – value of harmonic constituents:** IHO Definition: Harmonic constituents are the harmonic elements in a mathematical expression for the tide producing force and in the corresponding formula for the tidal curve. Each constituent represents a periodic change or variation in the relative positions of the earth, moon and sun. (Adapted from IHO Dictionary – S-32).

Indication: The first value is the number of columns (C, always 2) and the second is the number of rows (R). The next value(s) (C times) indicates the name(s) of the columns, and the next value(s) (R times) indicates the name(s) of the rows (i.e. constituents). Here after follow the values (C x R times) of amplitude and phase.

Example: The following example encodes the amplitude and the phase for M2, S2, K1 and O1:

2,4,amplitude,phase,M2,S2,K1,O1,0.962,165,0.361,243,1.223,097,0.875,143

	amplitude	phase
M2	0.962	165
S2	0.361	243
K1	1.223	097
O1	0.875	143

Remarks:

- The attribute "tide - value of harmonic constituents" contains a 2 dimensional array of harmonic constituents.

### 22.140 Tide, current – time interval of values (T\_TINT)

**Time, current – time interval of values:** IHO Definition:

Unit: Minute

Resolution: 1 minute.

Format: xxx

Example: 60 for a time interval of 60 minutes

Remarks:

- The attribute "Tide, current - time interval of values" encodes the interval between the values in any time series, e.g. tidal, current or other data.

**Comment [j198]:** MD8 – 2.Co.7 and 2.Cl.9

**Comment [j199]:** MD8 – 2.Co.7 and 2.Cl.9

### 22.141 Time end (TIMEND)

**Time end:** IHO Definition:

Indication: The "time end" must consist of a date and a time separated by a capital "T". The date must be encoded using 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD). The time must be encoded using 2 digits for the hour (hh), 2 digits for the minutes (mm) and 2 digits

for the seconds (ss). This conforms to ISO 8601:1988.

**Format:** CCYYMMDDThhmmss (**mandatory**)

**Example:** **20120426T094500** for a period ending at 09:45 am on 26 April 2012.

**Remarks:**

- The attribute "time end" indicates the end of **an** active period.

## 22.142 Time start (TIMSTA)

**Time start:** IHO Definition:

**Indication:** The "time start" **must** consist of a date and a time separated by a capital "T". The date **must** be encoded using 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD). The time **must** be encoded using 2 digits for the hour (hh), 2 digits for the minutes (mm) and 2 digits for the seconds (ss). This conforms to ISO 8601:1988.

**Format:** CCYYMMDDThhmmss (**mandatory**)

**Example:** **20120212T162000** for a period starting at 04:20 pm on 12 February 2012.

**Remarks:**

- The attribute "time start" indicates the start of **an** active period.

## 22.143 Topmark/daymark shape (TOPSHP)

**Topmark/daymark shape:** IHO Definition:

**Cone:** A solid figure generated by straight lines drawn from a fixed point (the vertex) to a circle in a plane not containing the vertex. (The New Shorter Oxford English Dictionary, 1993, vol 2).

**Cones** are commonly used as International Association of Lighthouse Authorities - IALA topmarks (lateral). (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.222, November 2000).

### 1) Cone, point up

**IHO Definition:** Is where the vertex points up. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.222, November 2000).

### 2) Cone, point down

**IHO Definition:** Is where the vertex points down. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.222, November 2000).

### 3) Sphere

**IHO Definition:** A body the surface of which is at all points equidistant from the centre. (The New Shorter Oxford English Dictionary, 1993, vol 2).

**Spheres** are commonly used as International Association of Lighthouse Authorities - IALA topmarks (safe water). (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.223, November 2000).

### 4) 2 spheres

**IHO Definition:** Two black spheres, one above the other. Two spheres are commonly used as an International Association of Lighthouse Authorities - IALA topmark (isolated danger). (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.223, November 2000).

### 5) Cylinder (can)

**IHO Definition:** A solid geometrical figure generated by straight lines fixed in direction and describing with one of point a closed curve, especially a circle (in which case the figure is circular cylinder, its ends being parallel circles). (The New Shorter Oxford English Dictionary, 1993, vol 2).

**Cylinders** are commonly used as International Association of Lighthouse Authorities - IALA topmarks (lateral). (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.223, November 2000).

### 6) Board

**IHO Definition:** Usually of rectangular shape, made from timber or metal and used to provide a contrast with the natural background of a daymark. The actual daymark is often painted on to this board. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.223, November 2000).

**7) X-shaped (St. Andrew's cross)**

**IHO Definition:** Having a shape or a cross-section like the capital letter X. (The New Shorter Oxford English Dictionary, 1993, vol 2).

An x-shape as an International Association of Lighthouse Authorities – IALA topmark should be 3 dimensional in shape. It is made of at least three crossed bars. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.223, November 2000).

**8) Upright cross (St George's cross)**

**IHO Definition:** A cross with one vertical member and one horizontal member, i.e. similar in shape to the character "+". (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.223, November 2000).

**9) Cube, point up**

**IHO Definition:** A cube is a solid contained by six equal squares; a regular hexahedron (The New Shorter Oxford English Dictionary, 1993, vol 2).

A cube, point up, is a cube standing on one of its vertexes.

**10) 2 cones, point to point**

**IHO Definition:** 2 cones, one above the other, with their vertices together in the centre. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.223, November 2000).

**11) 2 cones, base to base**

**IHO Definition:** 2 cones, one above the other, with their bases together in the centre and their vertices pointing up and down. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.223, November 2000).

**12) Rhombus (diamond)**

**IHO Definition:** A plane figure having four equal sides and equal opposite angles (two acute and two obtuse); an oblique equilateral parallelogram. (The New Shorter Oxford English Dictionary, 1993, vol 2).

**13) 2 cones (points upward)**

**IHO Definition:** 2 cones, one above the other, with their vertices pointing up.

**14) 2 cones (points downward)**

**IHO Definition:** 2 cones, one above the other, with their vertices pointing down.

**15) Besom, point up (broom or perch)**

**IHO Definition:** A bundle of rods or twigs. (The New Shorter Oxford English Dictionary, 1993, vol 2). A perch is a staff placed on top of a buoy, rock or shoal as a mark for navigation. (IHO Dictionary – S-32).

A besom, point up is where the thicker (untied) end of the besom is at the top.

**16) Besom, point down (broom or perch)**

**IHO Definition:** A bundle of rods or twigs. (The New Shorter Oxford English Dictionary, 1993, vol 2). A perch is a staff placed on top of a buoy, rock or shoal as a mark for navigation. (IHO Dictionary – S-32).

A besom, point up is where the thinner (tied) end of the besom is at the top.

**17) Flag**

**IHO Definition:** A flag mounted on a short pole. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.223, November 2000).

**18) Sphere over rhombus**

**IHO Definition:** A sphere located above a rhombus. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.223, November 2000).

**19) Square**

**IHO Definition:** A plane figure with four right angles and four equal straight sides (The New Shorter Oxford

English Dictionary, 1993, vol 2).

**20) Rectangle, horizontal**

IHO Definition: A rectangle is a plane figure with four right angles and four straight sides, opposite sides being parallel and equal in length (The New Shorter Oxford English Dictionary, 1993, vol 2).

A horizontal rectangle is where the two longer opposite sides are standing horizontally.

**21) Rectangle, vertical**

IHO Definition: A rectangle is a plane figure with four right angles and four straight sides, opposite sides being parallel and equal in length (The New Shorter Oxford English Dictionary, 1993, vol 2).

A vertical rectangle is where the two longer opposite sides are standing vertically.

**22) Trapezium, up**

IHO Definition: A trapezium is a quadrilateral having one pair of opposite sides parallel. (The New Shorter Oxford English Dictionary, 1993, vol 2).

A trapezium, up is a trapezium which stands on its longer parallel side. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.224, November 2000).

**23) Trapezium, down**

IHO Definition: A trapezium is a quadrilateral having one pair of opposite sides parallel. (The New Shorter Oxford English Dictionary, 1993, vol 2).

A trapezium, down is a trapezium which stands on its shorter parallel side. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.224, November 2000).

**24) Triangle, point up**

IHO Definition: A triangle is a figure having three angles and three sides. (New Shorter Oxford English Dictionary, 1993, vol 2).

A triangle, point up is a triangle which has a vertex at the top.

**25) Triangle, point down**

IHO Definition: A triangle is a figure having three angles and three sides. (New Shorter Oxford English Dictionary, 1993, vol 2).

A triangle, point down is a triangle which has a side at the top.

**26) Circle**

IHO Definition: A perfectly round plane figure whose circumference is everywhere equidistant from its centre. (The New Shorter Oxford English Dictionary, 1993, vol 1).

**27) Two upright crosses (one over the other)**

IHO Definition: Two upright crosses, generally vertically disposed one above the other. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.224, November 2000).

**28) T-shape**

IHO Definition: Having a shape like the capital letter T. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.224, November 2000).

**29) Triangle pointing up over a circle**

IHO Definition: A triangle, vertex uppermost, located above a circle. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.224, November 2000).

**30) Upright cross over a circle**

IHO Definition: An upright cross located above a circle. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.224, November 2000).

**31) Rhombus over circle**

IHO Definition: A rhombus located above a circle. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.224, November 2000).



**32) Circle over a triangle pointing up**

IHO Definition: A circle located over a triangle, vertex uppermost. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.224, November 2000).

**22.144 Traffic flow (TRAFIC)**

**Traffic flow:** IHO Definition:

**1) Inbound**

IHO Definition: Traffic flow in a general direction toward a port or similar destination. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.225, November 2000).

**2) Outbound**

IHO Definition: Traffic flow in a general direction away from a port or similar point of origin. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.225, November 2000).

**3) One-way**

IHO Definition: Traffic flow in one general direction only. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.225, November 2000).

**4) Two-way**

IHO Definition: Traffic flow in two generally opposite directions. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.225, November 2000).

**22.145 Value of annual change in magnetic variation (VALACM)**

**Value of annual change in magnetic variation:** IHO Definition: The annual change in magnetic variation values. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.226, November 2000).

Unit: minute ('), negative west

Resolution: 0.1'

Format: sxx.x

s: sign, negative values only

Example: -7.1 for an annual change of 7.1' in a westerly direction

Remarks:

- A positive value, i.e. unsigned, indicates a change in an easterly direction and a negative value indicates a change in a westerly direction.

**22.146 Value of depth contour (VALDCO)**

**Value of depth contour:** IHO Definition: The depth of a sea bottom contour. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.227, November 2000).

Unit: Defined in the DUNI subfield of the CRSH record or the DUNITS attribute of the M\_UNIT meta feature: metre (m)

Resolution: 0.1m

Format: sxxxxx.x

s: sign, negative values only

Example: 50 for a depth contour of 50 metres

Remarks:

- Drying contours are indicated by a negative value.

### 22.147 Value of local magnetic anomaly (VALLMA)

**Value of local magnetic anomaly:** IHO Definition: The value of the deviation from the normal magnetic variation. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.228, November 2000).

Unit: minute (')

Resolution: 0.1'

Format: xxx.x

Example: 180.3 for a deviation of  $\pm 3^{\circ} 00' 3''$

Remarks:

- The deviation is assumed to be positive and negative. The plus/minus character **must** not be encoded.

Comment [j200]: MD8 – 7.Co.21

### 22.148 Value of magnetic variation (VALMAG)

**Value of magnetic variation:** IHO Definition: The magnetic variation value. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.229, November 2000).

Unit: degree (°), negative west

Resolution: 0.01°

Format: sxx.xx

s: sign, negative values only

Example: 2.3 for a magnetic north oriented at  $2^{\circ} 18'$  east from the geographic (true) north

Remarks:

- A positive value, i.e. unsigned, indicates a change in an easterly direction and a negative value indicates a change in a westerly direction.

### 22.149 Value of maximum range (VALMXR)

**Value of maximum range:** IHO Definition: The extreme distance at which an object can be seen or a signal detected. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.230, November 2000).

Unit: Nautical mile (M)

Resolution: 0.1M

Format: xx.x

Example: 17 for maximum range of 17 nautical miles

Remarks:

- This attribute does not apply to lights where the attribute “value of nominal range” should be used.

### 22.150 Value of nominal range (VALNMR)

**Value of nominal range:** IHO Definition: The nominal range at which an object can be seen or a signal detected. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.231, November 2000).

Unit: Nautical mile (M)

Resolution: 0.1M

Format: xx.x

Example: 14 for a nominal range of 14 nautical miles

Remarks:

- The nominal range is normally the luminous range of a light in a homogeneous atmosphere in which the meteorological visibility is 10 sea miles. (IHO Dictionary – S-32).

### 22.151 Value of sounding (VALSOU)

**Value of sounding:** IHO Definition: The value of the measurement of a sounding relative to the chart datum. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.232, November 2000).

Unit: Defined in the DUNI subfield of the CRSH record or the DUNITs attribute of the M\_UNIT meta feature: metre (m)

Resolution: 0.1m

Format: sxxxxx.x

s: sign, negative values only

Examples: 18.2 for a sounding of 18.2 metres  
-2.4 for a drying height of 2.4 metres

Remarks:

- A drying height is indicated by a negative value.

### 22.152 Vertical clearance (VERCLR)

**Vertical clearance:** IHO Definition: The vertical clearance measured from the horizontal plane towards the object overhead. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.234, November 2000).

Unit: Defined in the HUNI subfield of the CRSH record or the HUNITs attribute of the M\_UNIT meta feature: metre (m)

Resolution: 0.1m

Format: xx.x

Example: 7.6 for a vertical clearance of 7.6 metres

Remarks:

- In the case of cables carrying high voltages an additional clearance of from 2 to 5 metres may be needed to avoid an electrical discharge. When known, the authorised safe clearance (known in the UK as the Safe Overhead Clearance) which is the physical clearance minus a safety margin shall be stated, using the attribute **vertical clearance, safe**. **Vertical clearance** must not be used to populate authorized safe clearances.

### 22.153 Vertical clearance, closed (VERCCL)

**Vertical clearance, closed:** IHO Definition: The vertical clearance of an object in closed condition (e.g. a closed lifting bridge) measured from the horizontal plane towards the object overhead. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.235, November 2000).

Unit: Defined in the HUNI subfield of the CRSH record or the HUNITs attribute of the M\_UNIT meta feature: metre (m)

Resolution: 0.1m

Format: xx.x

Example: 11.2 for a vertical clearance of 11.2 metres

### 22.154 Vertical clearance, open (VERCOP)

**Vertical clearance, open:** IHO Definition: The vertical clearance of an object in opened condition (e.g. an opened lifting bridge) measured from the horizontal plane towards the object overhead. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.236, November 2000).

Unit: Defined in the HUNI subfield of the CRSH record or the HUNITs attribute of the M\_UNIT meta feature: metre (m)

Resolution: 0.1

Format: xx.x

Example: 17.8 for a vertical clearance of 17.8 metres

## 22.155 Vertical clearance, safe (VERCSA)

**Vertical clearance, safe:** IHO Definition: The safe vertical clearance measured from the horizontal plane towards the object overhead. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.237, November 2000).

Unit: Defined in the HUNI subfield of the CRSH record or the HUNITS attribute of the M\_UNIT meta feature: metre (m)

Resolution: 0.1m

Format: xx.x

Example: 7.2 for a vertical clearance of 7.2 metres

Remarks:

- In the case of cables carrying high voltages, the quoted vertical clearance (**vertical clearance**) may have to be reduced by 2.5m to avoid electrical discharge. When known, this authorized safe clearance (known in the UK as the Safe Overhead Clearance) which is the physical clearance minus a safety margin **must** be stated, using **vertical clearance, safe**.

## 22.156 Vertical datum (VERDAT)

**Vertical datum:** IHO Definition:

1) **Mean low water springs**

IHO Definition: (MLWS) - the average height of the low waters of spring tides. Also called spring low water. (IHO Dictionary – S-32).

2) **Mean lower low water springs**

IHO Definition: (MLLWS) - the average height of lower low water springs at a place. (IHO Dictionary – S-32).

3) **Mean sea level**

IHO Definition: (MSL) - the average height of the surface of the sea at a tide station for all stages of the tide over a 19-year period, usually determined from hourly height readings measured from a fixed predetermined reference level. (IHO Dictionary – S-32).

4) **Lowest low water**

IHO Definition: An arbitrary level conforming to the lowest tide observed at a place, or somewhat lower. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.239, November 2000).

5) **Mean low water**

IHO Definition: (MLW) - the average height of all low waters at a place over a 19-year period. (IHO Dictionary – S-32).

6) **Lowest low water springs**

IHO Definition: An arbitrary level conforming to the lowest water level observed at a place at spring tides during a period of time shorter than 19 years. (Hydrographic Service, Royal Australian Navy).

7) **Approximate mean low water springs**

IHO Definition: An arbitrary level, usually within  $\pm 0.3\text{m}$  from that of mean low water springs (MLWS). (Hydrographic Service, Royal Australian Navy).

8) **Indian spring low water**

IHO Definition: (ISLW) - an arbitrary tidal datum approximating the level of the mean of the lower low water at spring tides. Also called Indian tidal plane. (IHO Dictionary – S-32).

A tidal datum approximating the lowest water level observed at a place, originated by G.H. Darwin for the tides of India at a level below MSL being equal to the sum of amplitudes of the harmonic constituents M2, S2, K1 and O1; usually below that of the lower low water at spring tides. Also called Indian tide plane. (Hydrographic

Service, Royal Australian Navy).

9) **Low water springs**

IHO Definition: An arbitrary level, approximating that of mean low water springs (MLWS). (Hydrographic Service, Royal Australian Navy).

10) **Approximate lowest astronomical tide**

IHO Definition: An arbitrary level, usually within  $\pm 0.3\text{m}$  from that of lowest astronomical tide (LAT). (Hydrographic Service, Royal Australian Navy).

11) **Nearly lowest low water**

IHO Definition: An arbitrary level approximating the lowest water level observed at a place, usually equivalent to the Indian spring low water (ISLW). (Hydrographic Service, Royal Australian Navy).

12) **Mean lower low water**

IHO Definition: (MLLW) - the average height of the lower low waters at a place over a 19-year period. (IHO Dictionary – S-32).

13) **Low water**

IHO Definition: An approximation of mean low water adopted as the reference level for a limited area, irrespective of better determinations at a later date. Used mostly in harbour and river engineering. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.239, November 2000).

Used in inland (non-tidal) waters. It is generally defined as a level which the daily mean water level would fall below less than 5% of the time and by no more than 0.2 metres during the navigation season. A single level surface is usually chosen as the low water datum for a whole lake. On a river, low water datum is a sloping surface which approximates the river surface at a low state. (Canadian Hydrographic Service)

14) **Approximate mean low water**

IHO Definition: An arbitrary level, usually within  $\pm 0.3\text{m}$  from that of mean low water (MLW). (Hydrographic Service, Royal Australian Navy).

15) **Approximate mean lower low water**

IHO Definition: An arbitrary level, usually within  $\pm 0.3\text{m}$  from that of mean lower low water (MLLW). (Hydrographic Service, Royal Australian Navy).

16) **Mean high water**

IHO Definition: (MHW) - The average height of all high waters at a place over a 19-year period. (IHO Dictionary, S-32).

17) **Mean high water springs**

IHO Definition: (MHWS) - The average height of the high waters of spring tides. Also called spring high water. (IHO Dictionary, S-32).

18) **High water**

IHO Definition: The highest level reached at a place by the water surface in one tidal cycle. Also called high tide. (IHO Dictionary, S-32).

19) **Approximate mean sea level**

IHO Definition: An arbitrary level, usually within  $\pm 0.3\text{m}$  from that of mean sea level (MSL). (Hydrographic Service, Royal Australian Navy).

20) **High water springs**

IHO Definition: An arbitrary level, approximating that of mean high water springs (MHWS). (Hydrographic Service, Royal Australian Navy).

21) **Mean higher high water**

IHO Definition: (MHHW) - The average height of higher high waters at a place over a 19-year period. (IHO Dictionary, S-32).

22) **Equinoctial spring low water**

**IHO Definition:** The level of low water springs near the time of an equinox. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.240, November 2000).

23) **Lowest astronomical tide**

**IHO Definition:** (LAT) - the lowest tide level which can be predicted to occur under average meteorological conditions and under any combination of astronomical conditions. (IHO Dictionary – S-32).

24) **Local datum**

**IHO Definition:** An arbitrary datum defined by a local harbour authority, from which levels and tidal heights are measured by this authority. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.240, November 2000).

25) **International Great Lakes Datum 1985**

**IHO Definition:** (IGLD 1985) - A vertical reference system with its zero based on the mean water level at Rimouski/Pointe-au-Père, Quebec, over the period 1970 to 1988. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.240, November 2000).

26) **Mean water level**

**IHO Definition:** The average of all hourly water levels over the available period of record. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.240, November 2000).

27) **Lower low water large tide**

**IHO Definition:** (LLWLT) - The average of the lowest low waters, one from each of 19 years of observations. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.240, November 2000).

28) **Higher high water large tide**

**IHO Definition:** (HHWLT) - The average of the highest high waters, one from each of 19 years of observations. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.240, November 2000).

29) **Nearly highest high water**

**IHO Definition:** An arbitrary level approximating the highest water level observed at a place, usually equivalent to the high water springs. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.240, November 2000).

30) **Highest astronomical tide (HAT)**

**IHO Definition:** The highest tidal level which can be predicted to occur under average meteorological conditions and under any combination of astronomical conditions. (IHO Dictionary, S-32).

**Remarks:**

- This attribute is used to specify the datum to which both heights (vertical datum) and soundings (sounding datum) are referred.
- When the vertical datum is unknown, such as water areas above locks, the value "local datum" should be used, and further details may be encoded using the attribute "information" (see clause X.X).
- The  $\pm 0.3\text{m}$  approximation quoted in the "approximate" levels is somehow arbitrary and follows the British example of their definition for "approximate LAT".

## 22.157 Vertical length (VERLEN)

**Vertical length:** **IHO Definition:** The total vertical length of an object. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.242, November 2000).

**Unit:** Defined in the HUNI subfield of the CRSH record or the HUNITS attribute of the M\_UNIT meta feature: metre (m)

**Resolution:** 0-1m

**Format:** xxx.x

**Example:** 24.5 for a vertical length of 24.5 metres

**Remarks:**

- For floating features: The vertical distance from the surface of water to the highest point of that feature.
- For fixed features: The vertical distance from seabed or ground to the highest point of that feature.
- For features on top of other features: the vertical distance from the lowest to the highest point of that feature.

- Vertical length measurements do not require a datum.

## 22.158 Water level effect (WATLEV)

**Water level effect:** IHO Definition:

1) **Partly submerged at high water**

IHO Definition: Partially covered and partially dry at high water. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.243, November 2000).

2) **Always dry**

IHO Definition: Not covered at high water under average meteorological conditions. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.243, November 2000).

3) **Always under water / submerged**

IHO Definition: Remains covered by water at all times under average meteorological conditions. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.243, November 2000).

4) **Covers and uncovers**

IHO Definition: Expression intended to indicate an area of a reef or other projection from the bottom of a body of water which periodically extends above and is submerged below the surface. Also referred to as dries or uncovers. (IHO Dictionary – S-32).

5) **Awash**

IHO Definition: Flush with, or washed by the waves at low water under average meteorological conditions. (Adapted from IHO Dictionary – S-32).

6) **Subject to inundation or flooding**

IHO Definition: An area periodically covered by flood water, excluding tidal waters. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

7) **Floating**

IHO Definition: Resting or moving on the surface of a liquid without sinking (Concise Oxford Dictionary).

Remarks:

- The attribute “water level effect” encodes the effect of the surrounding water on an object.

## 23 Meta and Spatial Attribute and Enumerate Descriptions

### 23.1 Category of coverage (CATCOV)

**Category of coverage:** IHO Definition:

1) **Coverage available**

IHO Definition: Continuous coverage of spatial objects is available within this area. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.24 November 2000).

2) **No coverage available**

IHO Definition: An area containing no spatial objects. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.24 November 2000).

### 23.2 Category of zone of confidence (CATZOC)

**Category of zone of confidence:**

1	2	3		4	5
ZOC <sup>1</sup>	Position Accuracy <sup>2</sup>	Depth Accuracy <sup>3</sup>		Seafloor Coverage	Typical Survey Characteristics <sup>5</sup>
A1	± 5 m + 5% depth	= 0.50 + 1% d		Full area search undertaken. Significant seafloor features detected <sup>4</sup> and depths measured.	Controlled, systematic survey <sup>6</sup> high position and depth accuracy achieved using DGNS or a minimum three high quality lines of position (LOP) and a multibeam, channel or mechanical sweep system.
		Depth (m)	Accuracy (m)		
		10	± 0.6		
		30	± 0.8		
A2	± 20 m	= 1.00 + 2% d		Full area search undertaken. Significant seafloor features detected <sup>4</sup> and depths measured.	Controlled, systematic survey <sup>6</sup> achieving position and depth accuracy less than ZOC A1 and using a modern survey echosounder <sup>7</sup> and a sonar or mechanical sweep system.
		Depth (m)	Accuracy (m)		
		10	± 1.2		
		30	± 1.6		
B	± 50 m	= 1.00 + 2% d		Full area search not achieved; uncharted features, hazardous to surface navigation are not expected but may exist.	Controlled, systematic survey achieving similar depth but lesser position accuracies than ZOCA2, using a modern survey echosounder <sup>7</sup> , but no sonar or mechanical sweep system.
		Depth (m)	Accuracy (m)		
		10	± 1.2		
		30	± 1.6		
C	± 500 m	= 2.00 + 5% d		Full area search not achieved, depth anomalies may be expected.	Low accuracy survey or data collected on an opportunity basis such as soundings on passage.
		Depth (m)	Accuracy (m)		
		10	± 2.5		
		30	± 3.5		
D	worse than ZOC C	Worse Than ZOC C		Full area search not achieved, large depth anomalies may be	Poor quality data or data that cannot be quality assessed due to lack of
		Depth (m)	Accuracy (m)		
		10	± 2.5		
		30	± 3.5		



		expected.	information.
U	Unassessed - The quality of the bathymetric data has yet to be assessed		

**Remarks:**

**To decide on a ZOC Category, all conditions outlined in columns 2 to 4 of the table must be met.**

Explanatory notes quoted in the table:

- The allocation of a ZOC indicates that particular data meets minimum criteria for position and depth accuracy and seafloor coverage defined in this Table. ZOC categories reflect a charting standard and not just a hydrographic survey standard. Depth and position accuracies specified for each ZOC category refer to the errors of the final depicted soundings and include not only survey errors but also other errors introduced in the chart production process. Data may be further qualified by Object Class 'Quality of Data' (**Quality of Bathymetric Data**) sub-attributes as follows:

  - Positional Accuracy (**positional uncertainty**) and Sounding Accuracy (**sounding uncertainty**) may be used to indicate that a higher position or depth accuracy has been achieved than defined in this Table (e.g. a survey where full seafloor coverage was not achieved could not be classified higher than ZOC B; however, if the position accuracy was, for instance,  $\pm 15$  metres, the sub-attribute **positional uncertainty** could be used to indicate this).
  - Swept areas where the clearance depth is accurately known but the actual seabed depth is not accurately known may be accorded a 'higher' ZOC (i.e. A1 or A2) providing positional and depth accuracies of the swept depth meets the criteria in this Table. In this instance, Depth Range Value 1 (**depth range minimum value**) may be used to specify the swept depth. The position accuracy criteria apply to the boundaries of swept areas.
  - Survey date start, survey date end** and **technique of sounding measurement** may be used to indicate the start and end dates of the survey and the technique of sounding measurement.
- Position Accuracy of depicted soundings at 95% CI (2.45 sigma) with respect to the given datum. It is the cumulative error and includes survey, transformation and digitizing errors etc. Position accuracy need not be rigorously computed for ZOCs B, C and D but may be estimated based on type of equipment, calibration regime, historical accuracy etc.
- Depth accuracy of depicted soundings =  $a + (b-d)/100$  at 95% CI (2.00 sigma), where d = depth in metres at the critical depth. Depth accuracy need not be rigorously computed for ZOCs B, C and D but may be estimated based on type of equipment, calibration regime, historical accuracy etc.
- Significant seafloor features are defined as those rising above depicted depths by more than:

	Depth	Significant Feature
a.	<40 m	2 m
b.	>40 m	10% depth

A full seafloor search indicates that a systematic survey was conducted using detection systems, depth measurement systems, procedures, and trained personnel designed to detect and measure depths on significant seafloor features. Significant features are included on the chart as scale allows. It is impossible to guarantee that no significant feature could remain undetected, and significant features may have become present in the area since the time of the survey.
- Typical Survey Characteristics - These descriptions should be seen as indicative examples only.
- Controlled, systematic surveys (ZOC A1, A2 and B) - surveys comprising planned survey lines, on a geodetic datum that can be transformed to WGS 84.
- Modern survey echosounder - a high precision single beam depth measuring equipment, generally including all survey echosounders designed post 1970.

**Comment [j201]:** S-57  
Supplement No. 2

### 23.3 Compilation scale of data (CSCALE)

**Compilation scale:** IHO Definition: The scale at which the data was originally compiled. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.117, November 2000).

**Indication:** The modulus of the scale is indicated, that is 1:75 000 is encoded as 75000.

Unit: none

Resolution: 1

Minimum value: 1

Format: xxxxxxxx

Example: **75000** for a scale of 1:75000

Remarks:

- For example, the scale of the paper chart that was used for the ENC compilation. This attribute is only used in conjunction with the meta **feature** "Compilation Scale of data" (**Compilation Scale of Data**) which is used to define polygons of equal compilation scale. **compilation scale** should therefore not be confused with the attributes **scale minimum** and **scale maximum**.

### 23.4 Horizontal accuracy (HORACC)

**Horizontal accuracy:** IHO Definition: The best estimate of the horizontal accuracy of horizontal clearance distances. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.136, November 2000).

Unit: Defined in the HUNI subfield of the CRSH record or the HUNITS attribute of the M\_UNIT meta feature: m (m)

Resolution: 0.1m

Format: xx.x

Example: **0.5** for an error of 0.5 metres.

Remarks:

- The expected input is the radius of the two-dimensional error.
- The error is assumed to be positive and negative. The plus/minus character **must** not be encoded.

### 23.5 Horizontal datum (HORDAT)

**Horizontal datum:** IHO Definition:

- 1) **WGS 72**
- 2) **WGS 84**
- 3) **European 1950**
- 4) **Potsdam Datum**
- 5) **Adindan**
- 6) **Afgooye**
- 7) **Ain al Abd 1970**
- 8) **Anna 1 Astro 1965**
- 9) **Antigua island Astro 1943**
- 10) **Arc 1950**
- 11) **Arc 1960**
- 12) **Ascension Island 1958**
- 13) **Astro beacon "E" 1945**
- 14) **Astro DOS 71/4**
- 15) **Astro Tern Island (FRIG) 1961**
- 16) **Astronomical Station 1952**
- 17) **Australian Geodetic 1966**

- 18) **Australian Geodetic 1984**
- 19) **Ayabelle Lighthouse**
- 20) **Bellevue (IGN)**
- 21) **Bermuda 1957**
- 22) **Bissau**
- 23) **Bogota Observatory**
- 24) **Bukit Rimpah**
- 25) **Camp Area Astro**
- 26) **Campo Inchauspe 1969**
- 27) **Canton Astro 1966**
- 28) **Cape**
- 29) **Cape Canaveral**
- 30) **Carthage**
- 31) **Chatam Island Astro 1961**
- 32) **Chua Astro**
- 33) **Corrego Alegre**
- 34) **Dabola**
- 35) **Djakarta (Batavia)**
- 36) **DOS 1968**
- 37) **Easter Island 1967**
- 38) **European 1979**
- 39) **Fort Thomas 1955**
- 40) **Gan 1970**
- 41) **Geodetic Datum 1949**
- 42) **Graciosa Base SW 1948**
- 43) **Guam 1963**
- 44) **Gunung Segara**
- 45) **GUX 1 Astro**
- 46) **Heart North**
- 47) **Hjorsey 1955**
- 48) **Hong Kong 1963**
- 49) **Hu-Tzu-Shan**
- 50) **Indian**
- 51) **Indian 1954**
- 52) **Indian 1975**
- 53) **Ireland 1965**
- 54) **ISTS 061 Astro 1968**
- 55) **ISTS 061 Astro 1969**
- 56) **Johnston Island 1961**

- 57) **Kandawala**
- 58) **Kerguelen Island 1949**
- 59) **Kertau 1948**
- 60) **Kusaie Astro 1951**
- 61) **L. C. 5 Astro 1961**
- 62) **Leigon**
- 63) **Liberia 1964**
- 64) **Luzon**
- 65) **Mahe 1971**
- 66) **Massawa**
- 67) **Merchich**
- 68) **Midway Astro 1961**
- 69) **Minna**
- 70) **Montserrat Island Astro 1958**
- 71) **M'Poraloko**
- 72) **Nahrwan**
- 73) **Naparima, BWI**
- 74) **North American 1927**
- 75) **North American 1983**
- 76) **Abervatorio Meteorologico 1939**
- 77) **Old Egyptian 1907**
- 78) **Old Hawaiian**
- 79) **Oman**
- 80) **Ordinance Survey of Great Britain 1936**
- 81) **Pico de las Nieves**
- 82) **Pitcairn Astro 1967**
- 83) **Point 58**
- 84) **Pointe Noire 1948**
- 85) **Porto Santo 1936**
- 86) **Provisional South American 1936**
- 87) **Provisional South Chilean 1963 (also known as Hito XVIII 1963)**
- 88) **Puerto Rico**
- 89) **Qatar national**
- 90) **Qornoq**
- 91) **Reunion**
- 92) **Rome 1940**
- 93) **Santo (DOS) 1965**
- 94) **Sao Braz**
- 95) **Sapper Hill 1943**

- 96) **Schwarzeck**
- 97) **Selvagem Grande 1938**
- 98) **South American 1969**
- 99) **South Asia**
- 100) **Tananarive Observatory 1925**
- 101) **Timbalai 1948**
- 102) **Tokyo**
- 103) **Tristan Astro 1968**
- 104) **Viti Levu 1916**
- 105) **Wake-Eniwetok 1960**
- 106) **Wake Island Astro 1952**
- 107) **Yacare**
- 108) **Zanderij**
- 109) **American Samoa 1962**
- 110) **Deception Island**
- 111) **Indian 1960**
- 112) **Indonesian 1974**
- 113) **North Sahara 1969**
- 114) **Pulkovo 1942**
- 115) **S-42 (Pulkovo 1942)**
- 116) **S-JYSK**
- 117) **Viorol 1950**
- 118) **Average Terrestrial System 1977**
- 119) **Compensation Geodesique du Quebec 1977**
- 120) **Finnish (KKJ)**
- 121) **Ordnance Survey of Island**
- 122) **Revised Kertau**
- 123) **Revised Nahrwan**
- 124) **GGRS 76 (Sweden)**
- 125) **Nouvelle Triangulation de France**
- 126) **RT 90 (Sweden)**
- 127) **Geocentric Datum of Australia (GDA)**
- 128) **BJZ54 (A954 Beijing Coordinates)**
- 129) **Modified BJZ54**
- 130) **GDZ80**
- 131) **Local Datum**

Remarks:

- The attribute **horizontal datum** is only permitted for the **meta feature Horizontal Shift Parameters**.
- All necessary information for conversion of geographic coordinates from most of the Geodetic Datums in the above list to WGS-84 is contained in the "User's Handbook on Datum Transformations involving WGS-84",

prepared by the US Defense Mapping Agency and which is available from the IHB as IHO Publication S-60 (English and French Versions), along with an associated standard datum transformation software on floppy disk called "MADTRAN". The resulting latitude and longitude offsets can be encoded in the attribute SHIPAM.

### 23.6 Positional uncertainty (POSACC)

**Positional uncertainty:** IHO Definition: The best estimate of the accuracy of a position. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.255, November 2000).

Unit: Defined in the PUNI subfield of the CRSH record, e.g. metre (m)

Resolution: 0.1m or 0.1mm

Format: xxxx.x

Example: 25 for an error of 25 metres

### 23.7 Quality of position (QUAPOS)

**Quality of position:** IHO Definition:

#### 132) Surveyed

IHO Definition: The position(s) was(were) determined by the operation of making measurements for determining the relative position of points on, above or beneath the earth's surface. Survey implies a regular, controlled survey of any date. (Adapted from IHO Dictionary – S-32, & IHO Chart Specifications, M-4, 175.2).

#### 133) Unsurveyed

IHO Definition: Survey data is does not exist or is very poor. (Adapted from IHO Dictionary – S-32).

#### 134) Inadequately surveyed

IHO Definition: Position data is of a very poor quality. (Adapted from IHO Dictionary – S-32).

#### 135) Approximate

IHO Definition: A position that is considered to be less than third-order accuracy, but is generally considered to be within 30.5 metres of its correct geographic location. Also may apply to a feature whose position does not remain fixed. (Adapted from IHO Dictionary – S-32, & IHO Specifications, M-4, 424.1).

#### 136) Position doubtful

IHO Definition: A feature whose position has been reported but which is considered to be doubtful. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.256, November 2000).

#### 137) Unreliable

IHO Definition: A feature's position obtained from questionable or unreliable data. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.256, November 2000).

#### 138) Reported (not surveyed)

IHO Definition: A feature whose position has been reported and its position confirmed by some means other than a formal survey such as an independent report of the same feature.. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.256, November 2000).

#### 139) Reported (not confirmed)

IHO Definition: A feature whose position has been reported and its position has not been confirmed. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.256, November 2000).

#### 140) Estimated

IHO Definition: The most probable position of a feature determined from incomplete data or data of questionable accuracy. (Adapted from IHO Dictionary – S-32).

#### 141) Precisely known

IHO Definition: A position that is of a known value, such as the position of an anchor berth or other defined

feature..(S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.257, November 2000).

#### 142) **Calculated**

**IHO Definition:** A position that is computed from data. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.257, November 2000).

### 23.8 Scale value one (SCVAL1)

**Scale value one:** **IHO Definition:** The largest scale for the range of survey scale as used in source diagram information. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.182, November 2000).

**Indication:** The modulus of the scale is indicated, that is 1:25 000 is encoded as 25000.

**Unit:** none

**Resolution:** 1

**Minimum value:** 1

**Format:** xxxxxxxx

**Example:** **25000** for a scale of 1:25000

### 23.9 Scale value two (SCVAL2)

**Scale value two:** **IHO Definition:** The smallest scale for the range of survey scale as used in source diagram information. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.183, November 2000).

**Indication:** The modulus of the scale is indicated, that is 1:250 000 is encoded as 250000.

**Unit:** none

**Resolution:** 1

**Minimum value:** 1

**Format:** xxxxxxxx

**Example:** **250000** for a scale of 1:250000

### 23.10 Shift parameters (SHIPAM)

**Shift parameters:** **IHO Definition:** Latitude and longitude offsets required to shift a position from one geodetic datum to another. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.186, November 2000).

**Indication:**

**Latitude:** Shift parameter in latitude from the specified horizontal datum to the horizontal datum of the data.

**Unit:** minutes ('), negative south.

**Resolution:** 0.001 minute.

**Longitude:** Shift parameter in longitude from the specified horizontal datum to the horizontal datum of the data.

**Unit:** minutes ('), negative west.

**Resolution:** 0.001 minute.

**Format:**

sxx.xxx, syy.yyy

sxx.xxx: lat

syy.yyy: lon

s: sign, negative values only.

**Example:**

**-0.03,0.07** in the following case:

Position on specified datum:	20°40'36 (N)	085°20'05 (E)
Shift parameters (-0.03,0.07):	-0.03 (S)	0.07 (E)
	=====	=====
Position on datum of data:	20°40'33 (N) :	085°20'12 (E)

**Remarks:**

- All necessary information for conversion of geographic coordinates from most of the Geodetic Datums in the above list to WGS-84 is contained in the "User's Handbook on Datum Transformations involving WGS-84", prepared by the US Defence Mapping Agency and which is available from the IHB as IHO Publication S-60 (English and French Versions), along with an associated standard datum transformation software on floppy disk called "MADTRAN". The resulting latitude and longitude offsets can be encoded in the attribute **shift parameters**.
- Additional information on the transformation as indicated in IHO Publication S-60, e.g. TOY-M (Mean Solution), TOY-A (Japan), TOY-B (South Korea) or TOY-C (Okinawa) in relation to Tokyo Datum, may be encoded in the attribute **information** or **information in national language**.

**23.11 Sounding uncertainty (SOUACC)**

**Sounding uncertainty:** IHO Definition: The best estimate of the accuracy of a sounding.

Unit: Defined in the DUNI subfield of the CRSH record or the DUNITS attribute of the M\_UNIT meta feature: metre (m).

Resolution: 0.1m

Format: xx.x

Example: 25 for an error of 25 metres

**Remarks:**

- The maximum of the one-dimensional error. The error is assumed to be positive and negative. The plus/minus character **must** not be encoded.

**23.12 Sounding distance - maximum (SDISMX)**

**Sounding distance - maximum:** IHO Definition: The maximum spacing of the principal sounding lines of a survey. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.193, November 2000).

Unit: Defined in the HUNI subfield of the CRSH record or the HUNITS attribute of the M\_UNIT meta feature: metre (m).

Resolution: 1m

Format: xxxx

Example: 150 for a maximum spacing of 150 metres

**23.13 Sounding distance - minimum (SDISMN)**

**Sounding distance - minimum:** IHO Definition: The minimum spacing of the principal sounding lines of a survey. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.194, November 2000).

Unit: Defined in the HUNI subfield of the CRSH record or the HUNITS attribute of the M\_UNIT meta feature: metre (m).

Resolution: 1m

Format: xxxx

Example: 50 for a maximum spacing of 50 metres



### 23.14 Source date (SORDAT)

**Source date:** IHO Definition: The production date of the source, e.g. the date of measurement.

Indication: The source should be encoded using 4 digits for the calendar year (CCYY), 2 digits for the month (MM) and 2 digits for the day (DD). When no specific month and/or day is required/known, indication of the month and/or the day is omitted. This conforms to ISO 8601: 1988.

Format: CCYYMMDD (full date, mandatory)  
 CCYYMM (no specific day required – mandatory)  
 CCYY (no specific month required – mandatory)

Example: 19820506 for 6 May 1982 as source date.

**Comment [j202]:** MD8 – 4.Cl.10 and 4.Co.12

**Comment [j203]:** MD8 – 4.Cl.10 and 4.Co.12.

### 23.15 Source indication (SORIND)

**Source indication** IHO Definition: Information about the source of the feature.

Indication:

Country (c2): (mandatory): Two letter code from ISO 3166 (refer to S-62)

Authority (c2): (mandatory): A string of two alphanumeric characters (refer to S-62), e.g. German Bundesamt für Seeschifffahrt und Hydrographie = DE; US National Imagery and Mapping Agency = U1.

Source (c5): Graphic e.g. plotting sheet, paper chart = graph  
 Report e.g. wreck report = rept

ID-Code (c...): e.g. Code of paper chart

Format: c2,c2,c5,c...

Example: DK,D1,graph,chart196

### 23.16 Survey authority (SURATH)

**Survey authority:** IHO Definition: The authority which was responsible for the survey. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.200, November 2000).

Example:

Hydrographic Service, Royal Australian Navy  
 Port of Melbourne Authority

Remarks:

- The attribute “survey authority” encodes the name of the source survey authority.

### 23.17 Survey date - end (SUREND)

**Survey date - end:** IHO Definition: The end date of the survey. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.201, November 2000).

Indication: The “survey date, end” should be encoded using 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD). When no specific month and/or day is required/known, indication of the month and/or the day is omitted. This conforms to ISO 8601: 1988.

Format: CCYYMMDD (full date, mandatory)  
 CCYYMM (no specific day required – mandatory)  
 CCYY (no specific month required – mandatory)

Example: 19781127 for a survey ending on 27 November 1978.

### 23.18 Survey date - start (SURSTA)

**Survey date - start:** IHO Definition: The start date of the survey. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.202, November 2000).

Indication: The “survey date, end” should be encoded using 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD). When no specific month and/or day is required/known, indication of the month and/or the day is omitted. This conforms to ISO 8601: 1988.

Format: CCYYMMDD (full date, **mandatory**)  
 CCYYMM (no specific day required – **mandatory**)  
 CCYY (no specific month required – **mandatory**)

Example: 198403 for a survey starting in March 1984.

### 23.19 Survey type (SURTYP)

**Survey type:** IHO Definition:

1) **Reconnaissance/sketch survey**

IHO Definition: A survey made to a lower degree of accuracy and detail than the chosen scale would normally indicate. (IHO Dictionary – S-32).

2) **Controlled survey**

IHO Definition: A thorough survey usually conducted with reference to guidelines. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.203, November 2000).

4) **Examination survey**

IHO Definition: A survey principally aimed at the investigation of underwater obstructions and dangers. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.203, November 2000).

5) **Passage survey**

IHO Definition: A survey where soundings are acquired by vessels on passage. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.203, November 2000).

6) **Remotely sensed**

IHO Definition: a survey where features have been positioned and delimited using remote sensing techniques. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.203, November 2000).

### 23.20 Vertical accuracy (VERACC)

**Sounding uncertainty:** IHO Definition: The best estimate of the vertical accuracy of heights, vertical distances and vertical clearances, excluding sounding measurements.

Unit: Defined in the HUNI subfield of the CRSH record or the HUNITS attribute of the M\_UNIT meta feature: metre (m).

Resolution: 0-1m

Format: xx.x

Example: 1.2 for an error of 1-2 metres

Remarks:

- The maximum of the one-dimensional error. The error is assumed to be positive and negative. The plus/minus character **must** not be encoded.

## 24 Updating (see S-4 – B-600)

An ENC Update will be rejected by the ECDIS if it is located outside the area of data coverage for the **dataset** (i.e. area covered by the meta object **Data Coverage** with attribute **category of coverage = 1** (coverage available)) or if it changes the extent of this area. Where the area of data coverage for a base ENC **dataset** is to be changed, this should be done by issuing a New Edition of the **dataset**.

Additionally, it has been reported that some ECDIS experience problems in loading large Update data sets. Therefore, as a guide, ENC Updates should not exceed **50 Kilobytes** in size.

### 24.1 Issuing Updates in advance

Under certain conditions, it may be necessary for a data producer to issue Update information in advance. For example, a change in a traffic routing system must be made public before the new situation is implemented. Within an ER **dataset** there is no means of indicating the date at which an Update must be applied. Therefore, when an ER **dataset** is received by an end user, it must be applied immediately. To avoid situations where Update information would cause target data to reflect a situation that does not yet exist, the following encoding rules must be followed:

- a) If the advance Update information contained in the Update message involves the addition of **features** to the existing data (e.g. a new lighthouse), the **start date** sub-attribute for the complex attribute **date range** on the new **features** must contain the date at which the Update becomes active.
- b) If the advance Update information contained in the Update message involves the modification of existing **features** (e.g. a change in a traffic routing system), it must be treated as a deletion of the existing **features** and replacement with new **features**. See a) above and c) below.
- c) If the advance Update information contained in the Update message involves the deletion of existing **features** (e.g. the removal of a buoy), the Update message must set the **end date** sub-attribute for the complex attribute **date range** of all **features** to be deleted to the date at which the Update becomes active. **NB.** This Update message does not actually delete the **features** from the **dataset**, it simply indicates that on the date held in the **end date** sub-attribute for the complex attribute **date range** they become obsolete. A further Update to actually delete the obsolete **features** from the **dataset** should be sent at the time that the change in the real world occurs.
- d) To highlight to the mariner that the advance Update information contained in an Update message will take place in the future, it is recommended that a caution area **feature** (**Caution Area**) be created covering the location at which the future changes will take place. A warning note specifying, in plain language, the nature of the future change should be encoded, either in the attribute **information** or in a file referenced by the **textual description** attribute of the **Caution Area**. The sub-attribute **end date** sub-attribute for the complex attribute **date range** on the **Caution Area** must be set to the date at which the change described in the Update becomes active.

Changes to the **start date** and **end date** for **date range** cannot be applied to **spatial types**. Therefore, a change to the geometry of a real world **feature** (e.g. the relocation of a buoy) to be applied in the future can only be achieved by updating all of the **geo** and **spatial types** involved.

As a consequence of issuing advance information Updates, more than one instance of a particular real world **feature** could exist in the **dataset**.

Further information regarding issuing Update information in advance as an equivalent to the paper chart Preliminary Notices to Mariners process can be found at clause **X.X**.

#### 24.1.1 Advance notification of changes to traffic separation schemes

It is important that mariners be provided with advance notification of changes to traffic separation schemes (TSS), which may include modification to an existing TSS, addition of a new TSS or removal of a TSS. In order to provide a consistent approach to mariners regarding advance notification of changes to a traffic separation scheme, the following procedure should be adopted:

- 1) At least one month before the changes to the TSS come into force, issue an updated data set (as an Update or a New Edition) which:
  - Adds new or amended TSS component **features**. These **features** must have **start date for date range** populated with the date that the changes to the TSS come into force.
  - Adds **end date for date range** (populated with the date of the day before the changes to the TSS come into force) to any component **features** of the existing TSS that are to be changed or deleted.
  - Creates a **Caution Area surface feature** (see clause 6.6) covering the geographic extent of both the current and the future TSS. The attribute **information** or **textual description** must be used to explain the change to

the TSS, e.g. “The traffic separation scheme off Cape Bon is to be modified at 0000 UTC on 1 July 2009. This ENC includes all the information before and after the change, indicated by the sub-attributes **end date** (before the change) and **start date** (after the change) for the complex attribute **date range** on the components of the scheme”. The sub-attribute **end date on date range** for the **Caution Area** should be populated with the date at which the change comes into force or, if encoders wish to provide extended information to the mariner that a change has been made, with a date up to a month after the change comes into force. If the current and the future TSS are not in the same geographic area, it may be required to encode two distinct **Caution Area surface features**. A picture file may be referenced by a **Nautical Publication Information feature** (see clause X.X) sharing the same geometry as the **Caution Area** using the attribute **pictorial representation** if it is considered useful, e.g. the equivalent paper chart representation of the amended or new TSS. **As Nautical Publication Information features of type surface do not display in ECDIS a reference that a related Nautical Publication Information feature exists should be included using the attributes information or textual description for the Caution Area.**

2) As soon as possible after the modified/new/deleted TSS comes into force, issue an updated **dataset** (as an Update or New Edition) which:

- Deletes the changed or redundant component **features** of the former TSS.
- Removes the attribute **date range** from the component **features** of the new TSS.

3) The **Caution Area** (and **Nautical Publication Information** if encoded) must also be removed by Update, either as part of the Update to remove the redundant component **features** of the former TSS, or as a separate Update at a later date, corresponding to the date populated in the sub-attribute **end date for the complex attribute date range** for the **Caution Area**.

Encoders who are members of RENCs should also provide advance notification of changes to TSS to their RENC in accordance with RENC procedures, in order for the RENC to provide additional notification to mariners of impending TSS changes.

## 24.2 Guidelines for encoding Temporary and Preliminary ENC Updates

### 24.2.1 Introduction

The following provides high level guidance for the promulgation of the equivalent of paper chart Temporary (T) and Preliminary (P) Notices to Mariners (NMs) via ENC Updates. This guidance allows for some latitude in its application and is dependant on the assessment of each particular case, and as such relies ultimately on the judgement of each ENC Producing Authority.

### 24.2.2 Temporary (T) Notices to Mariners (see S-4 – B-633)

1. Temporary Notices to Mariners, (T)NMs, for paper charts are defined in S-4, Section B-600. A (T)NM promulgates navigationally significant information that will remain valid only for a limited period of time.

For the paper chart, the convention is for the mariner to insert the Update on the chart in pencil, and erase it when the (T)NM is cancelled.

**S-101** provides mechanisms which allow ENCs to be automatically updated (ER application profile<sup>1</sup>). This allows the affected ENC(s) to be continually updated in a timely manner for the duration of the NM without additional workload for the mariner.

Hydrographic Offices (HOs) should promulgate temporary navigationally significant information by ENC Update to provide the ECDIS user with an updated SENC. This service corresponds to the service that (T)NMs offer to the paper chart user.

2. ER encoding for an ENC and (T)NM for the paper chart are two completely different communication processes for promulgating information to the mariner. Since these processes are different (but not supposed to be independent), and the products to which they apply are also different, it is recommended that ENC Updates be derived from the source information rather than the paper chart (T)NM. Often the (T)NM for paper chart does not provide enough detail to apply the relevant ENC Update.

3. If possible the information should be encoded with the relevant S-57 objects. However, HOs should consider the following:

- An ENC Update must not be initiated if the information will no longer be valid by the time it is received by the mariner; this will depend upon the timescales relating to the Producer Nation's ENC Updating regime. Shorter time periods may be covered by Radio Navigational Warnings (RNW). If known, the ENC Update should include an indication of how long the temporary change will remain in force.

<sup>1</sup> The ER application profile only applies to ENC Update cell files. **S-101** Product Specification refers

- If it is unlikely that the HO will be notified when a temporary change will revert to its original charted state, the HO should consider an alternative method such as a general note or by issuing an ENC Update explaining, for example, that the aids to navigation within an area are reported to be unreliable.

It is important that HOs should consider constraints of time when identifying the encoding method. Time consuming and unnecessarily complex methods of encoding should be avoided.

4. The overuse of **Caution Area features** (especially **Caution Area** of type **surface** – see clause X.X) for temporary information should be avoided. The **Caution Area feature** is used when it is relevant for the situation and/or when a particular change needs a special warning. **Caution Area** may be used when the relevant **features** cannot be encoded, e.g. information cannot be displayed clearly or cannot be easily promulgated due to time constraints.
5. To correctly encode an ENC Update the source information is essential in determining which elements of the Update are reliable, which are permanent and which are temporary. The attribute **Status** with value 7 (temporary) should only be used in an Update when it is certain that the status of a **feature** is confirmed as temporary.

6. Use of complex attribute **date range**:

The earliest date on which a **feature** will be present (**start date**) and the latest date on which a **feature** will be present (**end date**) must only be encoded when known. *When these dates are encoded for navigational aids, **date range** must be populated on each component of the aid.*

The ENC Update should be issued as close as possible to the earliest date of the change (**start date**), unless it is appropriate to provide the information well in advance. A **feature** no longer present should be removed from the display by issuing a further Update as soon as possible after the return to the original charted state (**end date**). The timing of the issue of these Updates will depend upon the Producing Authority's ENC Updating regime and its corresponding timescales.

When an ENC Update promulgates information well in advance and uses **date range**, a **Caution Area feature** may be used in order to inform mariners that temporal information exists at some future point in time.

*NOTE: some older legacy ECDIS's may not have the functionality to manage temporal information correctly or may have implemented it incorrectly. Some ENC producers may wish to include additional encoding to safeguard against this. For example, insert a **CTNARE** describing the changes and timings.*

7. The attribute **information** should be used to provide supplementary or contextual information when encoding temporary (or preliminary) information. When the text is too long to be encoded using **information** (see clause X.X), the attribute **textual description** should be used. Encoders using **information/ textual description** to provide positional information must express the coordinate values in WGS 84 and in accordance with S-4 – B-131. If it is deemed necessary a picture file (**pictorial representation**) may be referenced. *If the relevant **feature class** (e.g. **Caution Area**) does not have **pictorial representation** as an allowable attribute, then **pictorial representation** may be populated for a **Nautical Publication Information feature** (see clause X.X) which shares the same geometry as the relevant **feature**. As **Nautical Publication Information features** of type **surface** do not display in ECDIS a reference that a related **Nautical Publication Information feature** exists should be included using the attributes **information** or **textual description** for the associated **feature**.*
8. ENC Updates issued for temporary information should be carefully managed and reviewed regularly to consider whether further action is necessary. New information may have been received that necessitates the issuing of a new Update to modify or cancel the previous one. Producing Authorities should make it easy to recover the original charted state before the temporary changes came into effect.
9. Further verification is recommended to make sure that the encoded ENC Update is consistent with the corresponding paper chart NM.
10. Guidelines for typical cases:
  - a) Individual new physical **features** (e.g. wreck, buoy) with no associated explicit or implicit area associated (e.g. restricted area):
    - Encode the relevant S-101 **feature**.
    - In this instance a **Caution Area feature** would not normally be used.
  - b) Individual new physical **feature(s)** with an associated explicit area around it:
    - Encode the relevant S-101 **surface feature** (e.g. **Restricted Area**). The relevant **feature** is encoded for the new physical **feature**. However, when the area is an "entry prohibited area" or a **Caution Area feature** the new physical **feature(s)** may be omitted to simplify encoding unless it is navigationally significant.

- c) Individual new physical **feature** with a notification of caution, e.g. "Mariners are advised to navigate with caution...":
- Encode the relevant S-101 **feature**. Additional clarification and advice may, if required, be provided using attributes **information** or **textual description**. Exceptionally, a **Caution Area feature** may be encoded to highlight the caution if considered necessary.
- d) Obstructions (including wrecks) reported to exist within an area:
- Encode an **Obstruction** or **Wreck feature** of type **surface** (see clauses X.X and X.X).
- e) New simple **surface feature** (military practice area, dredged area):
- Encode the relevant S-101 **surface feature**.
  - Supplementary information is provided using attributes **information** or **textual description**.
  - Normally, a **Caution Area feature** is not added.
- f) Complex information within an area (e.g. works in progress where the changes are numerous or involve complex changes to the topology):
- Encode the **surface feature**. It should be encoded with the relevant S-57 **feature** or, if more suitable or by default, a **Caution Area feature** (see clause X.X). Supplementary or contextual information is provided using attributes **information** or **textual description**. When the available information is sufficiently detailed, navigationally significant **features** (e.g. navigational aids, obstructions) should be encoded or modified within the area. When the available information does not permit this, a **Caution Area feature** defining the area is preferred.
- g) Changes to an existing **feature** (e.g. navigational aid):
- In these instances it is usually only necessary to change the attributes values. A **Caution Area feature** (see clause X.X) may be used to warn the mariner if it is considered necessary.
- h) Buoy temporarily moved:
- When a buoy is temporarily moved then it, and any associated **features**, are "moved" to the new position and the attribute **status** = 7 (temporary) is populated. Alternative encodings are possible, for example, if the move is for a fixed period of time. In these cases the **feature**, and any associated components, can be created in the temporary position with sub-attribute **end date for the complex attribute date range** populated with the date corresponding to the end of the fixed period of time. The currently charted **feature**, and any associated components, should have **start date for the complex attribute date range** also populated with the date corresponding to the end of the fixed period of time. A **Caution Area feature** may, if considered necessary, be added. Data producers may wish to consider the NOTE in section 6 above.
- i) Light temporarily extinguished:
- The attribute **status** for the **Light feature** is populated with the values 11 (extinguished) and 7 (temporary).
- j) Change to a maintained depth in a dredged area:
- When information is received from an official or recognised survey authority relating to a dredged area where the dredged depth has changed, the attribute value of **depth range minimum value** for the **Dredged Area feature** should be changed to the value provided by the survey.
  - Where a **Sounding feature** is encoded in a dredged area to indicate shoaler depths, the attribute value **exposition of sounding** = 2 (shoaler than the depth of the surrounding depth area) should not be populated (see clause X.X). Where required, the shoal depths should be encoded using **Sounding**, with the appropriate underlying depth information (**Depth Contour** and **Depth Area**) to support the depths. Alternatively, the attribute **depth range maximum value** for the **Dredged Area** may be set to the designed dredged depth for the dredged area and the attribute **depth range minimum value** set to the value of the shoalest depth, or a **Caution Area feature** may be encoded covering the shoaler depth area with the depth information provided using the attribute **information**. Where the shoal depths are close to the edge of the dredged area, the dredged area limit may be adjusted to exclude the shoal depths from the area. See also S-4 – B-414.5.

#### 24.2.3 Preliminary (P) Notices to Mariners (see S-4 – B-634)

1. Preliminary Notices to Mariners, (P)NMs, for paper chart are defined in S-4, Section B-600. A (P)NM promulgates navigationally significant information early to the mariner e.g. when a paper chart new edition cannot be issued in due time.

For the paper chart, the convention is for the mariner to insert the Update on the chart in pencil, and erase it when the (P)NM is cancelled.



**S-101** provides mechanisms which allow ENC(s) to be automatically updated (ER application profile). This allows the affected ENC(s) to be continually updated in a timely manner for the duration of the NM without additional workload for the mariner.

Producing Authority's should promulgate preliminarily navigational significant information by ENC Update to provide the ECDIS user with an updated SENC. This method of delivery corresponds to the service that (P)NMs offer to the paper chart user.

2. ER encoding for ENC and (P)NM for paper chart are two completely different communication processes for promulgating information to the mariner.

For example, there are instances when the paper chart needs updating using a NM block (also known as a chartlet or patch) or by issuing a New Edition due to the complexity or volume of changes. This could clutter the paper chart unacceptably if amended by hand and/or overburden the chart corrector. The lead time for a NM block correction or a New Edition can be lengthy, sometimes several months. In these cases a (P)NM may be issued as an interim measure. The ENC Updating mechanisms are more flexible and may allow for ENC Updates to be issued in quicker time. However, experience has shown that large Updates may result in processing issues in the ECDIS, in particular inordinately long loading times. Therefore producing an ENC New Edition may be the better option in some cases.

There may be other instances, when new information is received, where it is not possible to fully update both the ENC and paper chart promptly. For example, not all the information required to produce a chart-updating NM is received by the HO in the first notification (for instance notification of works in progress or projected), or extensive new information requires significant compilation work. In these cases it is still necessary to provide notification of navigational significant changes to the mariner in a timely manner.

Since the paper chart and ENC processes are different (but not supposed to be independent), and also the products to which they apply are different, it is recommended that ENC Updates be derived from the source information rather than from the paper chart (P)NM. It is often the case that the paper chart (P)NM does not provide enough detail to encode the ENC Update exactly as it should be.

3. Simple or more complex encoding methods are possible but it is important for Producing Authority's to consider carefully which encoding method is appropriate when creating an ENC Update with due consideration for time.
4. Often, information received is too complex, extensive and/or imprecise to be encoded with the relevant **S-101 features**. In these instances the use of a **Caution Area feature** (see clause **X.X**) and attribute **information** is preferred to give a précis of the overall changes together with detailed navigational significant information. For complex or extensive changes the **Caution Area** should have an associated **textual description** referencing a file containing precise details of the preliminary information. See also clause **X.X** section 7 above. If the information is less precise then **information** for the **Caution Area** should be used to inform mariners of this fact.

It is noted that the mariner, if it is considered necessary, has the facility in the ECDIS to add "Mariner Objects" and annotate them. These can be saved in the SENC based on information provided in textual form using the **textual description** or **information** attributes. It is envisaged that these **features** would be created at the "Route Planning" stage and act as a prompt during the "Route Monitoring" phase.

When information is issued as advance notification for an ENC it is necessary to provide as soon as possible to the mariner the final and full charted information encoded with the relevant **S-101 features**. An ENC Update or a New Edition of the ENC **dataset** should therefore be issued at a later date when the Producing Authority can carry out full encoding of the changes. The period of time will depend on the following:

- the time needed by the HO to undertake the full encoding with relevant **features**;
- the time needed to obtain confirmation of details; and
- the date at which the real world situation is stabilized and any forecast changes have been completed.

5. Source Information received may contain some navigational significant elements that are simple to encode with the relevant **features** in a timely manner. In such cases these elements may be encoded with the relevant **features** provided that they reflect the "real world" situation after the ENC Update is made available to the user. However, if the changes are subject to continual change these **features** should be amended as a consequence and will represent additional work for the HO. In such cases, the ENC Update should also warn the mariner that the situation is subject to change. For temporary information, see clause **X.X**.
6. Use of complex attribute **date range**: see clause **X.X** section 6. For new or amended routing measures, see clause 2.6.1.1.
7. Use of attribute **information**: see clause **X.X** section 7.
8. Diagrams are sometimes very useful to the mariner, e.g. for indicating changes to complex routing measures or the introduction of new ones. A picture file may be referenced using the attribute **pictorial representation** in

such cases. As **pictorial representation** is not a valid attribute for the **feature** class **Caution Area**, the picture file may be referenced by a **Nautical Publication Information feature** (see clause X.X) which shares the same geometry as the **Caution Area**. As **Nautical Publication Information features** of type **surface** do not display in ECDIS a reference that a related **Nautical Publication Information feature** exists should be included using the attributes **information** or **textual description** for the **Caution Area**.

9. ENC Updates issued for preliminary information should be managed and reviewed regularly. For example further source information may have been acquired requiring a further ENC Update. This may add, modify or cancel information previously promulgated.
10. Further verification is recommended to make sure that the encoded ENC Update is consistent with the corresponding paper notice.
11. Guidelines for typical cases:
  - a) Traffic separation schemes:
    - See clause X.X. For the use of the complex attribute **date range**, see also clause X.X section 6.
  - b) Complex information within an area of change (e.g. works in progress):
    - A **Caution Area feature** (see clause X.X) should be created to cover the area. Information is provided using either attribute **information**, e.g. *under construction*, or attribute **textual description** when it is necessary to give more detailed information. If sufficiently detailed information is available, then navigationally significant information such as navigational aids, fairways, regulated areas, etc. can be encoded or modified within the **Caution Area** if time permits.
    - As the **Caution Area feature** does not have **pictorial representation** as an allowable attribute, any picture file required may be referenced by a **Nautical Publication Information feature** (see clause X.X) which shares the same geometry as the **Caution Area**. As **Nautical Publication Information features** of type **surface** do not display in ECDIS a reference that a related **Nautical Publication Information feature** exists should be included using the attributes **information** or **textual description** for the **Caution Area**.
    - Alternatively, and if considered appropriate a **Restricted Area feature** (see clause X.X), with attribute **restriction** = 7 (entry prohibited) may be encoded instead the **Caution Area feature**.
  - c) Simple information which does not need an additional notification of caution:
    - The relevant **feature(s)** and the appropriate attributes should be encoded with any additional contextual information provided using the attributes **information** or **textual description**. In this case it is not necessary to use a **Caution Area feature**. This could apply, for example, to submarine cables or pipelines being laid (**Cable Submarine** or **Pipeline Submarine/On Land features**), or an area under reclamation (**Land Area feature** with attribute **condition** = 3 (under reclamation)). If required the encoding should reflect that positions are approximate using the spatial attribute **quality of position** = 4 (approximate) on the **spatial type(s)**.
  - d) Depths less than those charted within a defined area:
    - If the depth values and their positions are known, **Sounding features** (see clause X.X) may be created or modified. Any affected depth contours and depth areas should also be amended as necessary (see clause X.X Note). The source of the information should be encoded using the attribute **source indication**. However, Producing Authority's should carefully consider the time needed to update ENC depth information and the complexity of changes to the topology that may be required. The encoding of amended **Sounding**, **Depth Area** and associated **features** could be inappropriate for promulgating this navigationally significant information within acceptable time scales. In this case a **Caution Area** (see clause X.X) is the preferred option. In such cases, only the most significant amendments to depth information should be provided using the attributes **information** or **textual description**. This method should also be used if the depth values and/or the exact positions are unknown, or if the Producing Authority only has information relating to a limited number of depth values.