INTERNATIONAL HYDROGRAPHIC ORGANIZATION

IHO UNIVERSAL HYDROGRAPHIC DATA MODEL

Working Version – April 2010

Special Publication No. 101
Electronic Navigational Chart Product Specification

Appendix A
Data Classification and Encoding Guide

Comment [j1]: Is this what the document is going to be known as? Other alternatives include ????

Published by the
International Hydrographic Bureau
MONACO

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CONTENTS

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Document Control

Version	Version Type	Date	Approved By	Signed Off By	Role
0.0.0	Editing Committee Draft	Xxx 2010	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".

Comment [j2]: Is TSMAD happy to retain this order?

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.

Comment [j3]: 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?

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

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

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Contact: International Hydrographic Bureau
4 Quai Antione 1 er
B.P. 445
MC 98011 MONACO CEDEX
Telephone: +377 93 10 81 00
Fax: +377 93 10 81 40

URL: www.iho.int

Identifier: S-101 Appendix A

Maintenance: Changes to S-101 Appendix A Data Classification and Encoding Guide are coordinated by the IHO Transfer Standards Maintenance and Applications Development Working Group (TSMAD) and must be made available via the IHO web site.

Comment [j4]: 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: The **boundary** of a **curve** is the **set** of **points** at either end of the **curve**. If the curve is a cycle, the two ends are identical, and the curve (if topologically closed) is considered to not have a boundary. The first **point** is called the **start point**, and the last is the **end point**. Connectivity of the curve is guaranteed by the "continuous image of a line"

Comment [j5]: 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. Feature type or feature instance should be used when only one is meant

EXAMPLE: The phenomenon named "Eiffel Tower" may be classified with other phenomena into a feature type "tower"

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

point
0-dimensional geometric primitive, representing a position

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

1.3.2 Abbreviations

ENC	Electronic Navigational Chart
IHO	International Hydrographic Organization
SENC	System Electronic Navigational Chart
TSMAD	Transfer Standards Maintenance and Applications Development Working Group

Comment [j6]: 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 and 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.

Comment [j7]: Is this section required? Do TSMAD approve this strength of wording statement?

1.5 Maintenance

Comment [j8]: See comment in 1.1 above. Is this section required? Is this document going to be maintained as stand-alone (as the UOC was) or as part of overall PS maintenance?

1.5.1 Maintenance procedures

Changes to the Data Classification and Encoding Guide are coordinated by Transfer Standards Maintenance and Applications 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) Correction; and

(3) Extension.

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. Clarifications remove ambiguity and errors in spelling, punctuation and grammar. A clarification must not cause any substantive semantic change. A clarification must not also be classified as a correction. All clarifications must be available for immediate use when approved by the TSMAD.

1.5.1.2 Correction

Corrections are defined as substantive semantic changes to the Data Classification and Encoding Guide to correct factual errors. A correction must not also be classified as a clarification. One correction may result in multiple related actions. All cumulative clarifications must be included with the release of approved corrections. After approval the correction will be available for use at a date specified by the TSMAD.

1.5.1.3 Extension

Extensions 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. Extensions result in a new major version of the Data Classification and Encoding Guide. One extension may result in multiple related actions. All cumulative clarifications and corrections must be included with the release of approved extensions. After approval the extension will be available for use at a date specified by the TSMAD.

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, corrections and extensions. 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 Correction version control

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

1.5.2.3 Extension version control

Extensions must be denoted as x.0.0. Each extension or set of extensions approved at a single point in time must increment x by 1. Extension version control will set the clarification and correction 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 word is far too complex for a complete description to be practical; therefore a simplified, highly specific, view of the real world must be used. Th 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 w is is achieved by modeling the reality. Detailed information is available in IHO Special Publication hich the standard is based.

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

Appendix A: The Object Catalog

Appendix B: IHO approved Product Specifications

Comment [j9]: 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 shape 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.

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

Aggregated feature type – are features that are made up of componenet 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.

2.2 Spatial types

Spatial types may have descriptive attributes and must contain geometry. Allowable geometric primitives are point (P), line (L) and area (A).

Comment [j10]: Should this be line or curve? Result may effect Table below.

Each spatial feature instance must be referenced by another feature type 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 primitive for each feature type:

Comment [j15]: This is not a section in the Product Specification – should it be? This section needs to be expanded.

ACHARE	P		A		ACHBRT	P		A		ADMARE			A		AIRARE	P		A	
ARCSLN			A		ASLXIS		L			BCNCAR	P				BCNISD	P			
BCNLAT	P				BCNSAW	P				BCNSPP	P				BERTHS	P	L	A	
BOYCAR	P				BOYINB	P				BOYISD	P				BOYLAT	P			
BOYSAW	P				BOYSPP	P				BRIDGE	P	L	A		BUAARE	P		A	
BUISGL	P		A		CANALS		L	A		CAUSWY		L	A		CBLARE			A	
CBLOHD		L			CBLSUB		L			CGUSTA	P				CHKPNT	P		A	
COALNE		L			CONVYR		L	A		CONZNE			A		COSARE			A	
CRANES	P		A		CTNARE	P		A		CTRPNT	P				CTSARE	P		A	
CURENT	P				CUSZNE			A		DAMCON	P	L	A		DAYMAR	P			
DEPARE		L	A		DEPCNT		L			DISMAR	P				DOCARE			A	
DRGARE			A		DRYDOC			A		DMPGRD	P		A		DYKCON		L	A	
DWRTCL		L			DWRTPT			A		EXEZNE			A		FAIRWY			A	
FERYRT		L	A		FLODOC	P	L	A		FNCLNE		L			FOGSIG	P			
FORSTC	P	L	A		FRPARE			A		FSHFAC	P	L	A		FSHGRD			A	
FSHZNE			A		GATCON	P	L	A		GRIDRN	P		A		HRBARE			A	
HRBFAC	P		A		HULKES	P		A		ICEARE			A		ICNARE	P		A	
ISTZNE			A		LAKARE			A		LNDARE	P	L	A		LNDELV	P	L		
LNDMRK	P	L	A		LNDRGN	P		A		LIGHTS	P				LITFLT	P			
LITVES	P				LOCMAG	P	L	A		LOGPON	P		A		LOKBSN			A	
MAGVAR	P	L	A		MARCUL	P	L	A		MIPARE	P		A		MORFAC	P	L	A	
NAVLNE		L			OBSTRN	P	L	A		OFSPLF	P		A		OSPARE			A	
OILBAR		L			PILBOP	P		A		PILPNT	P	L			PIPARE	P		A	
PIPOHD		L			PIPSOL	P	L			PONTON	P	L	A		PRCARE	P		A	
PRDARE	P		A		PYLONS	P		A		RADLNE		L			RADRNG			A	
RADRFL	P				RADSTA	P				RAILWY		L			RAPIDS	P	L	A	
RCRTCL		L			RCTLPT	P		A		RDOCAL	P	L			RDOSTA	P			
RECTRC		L	A		RESARE			A		RETRFL	P				RIVERS		L	A	
ROADWY	P	L	A		RSCSTA	P				RTPBCN	P				RUNWAY	P	L	A	
SBDARE	P	L	A		SEAARE	P		A		SILTNK	P		A		SISTAT	P			
SISTAW	P				SLCONS	P	L	A		SLOTOP		L			SLOGRD	P		A	
SMCFAC	P		A		SOUNDG	P				SNDWAV	P	L	A		SPLARE	P		A	
SPRING	P				STSLNE		L			SUBTLN			A		SWPARE			A	
TESARE			A		TIDEWY		L	A		TOPMAR	P				TSELNE		L		
TSEZNE			A		TSSBND		L			TSSCRS			A		TSSLPT			A	
TSSRON			A		TUNNEL	P	L	A		TWRTPT			A		UNSARE			A	
UWTROC	P				VEGATN	P	L	A		WATFAL	P	L			WATTUR	P	L	A	
WEDKLP	P		A		WRECKS	P		A		C_AGGR				N	C_ASSO				N
M_ACCY			A		M_COVR			A		M_CSCL			A		M_HOPA			A	
M_NPUB	P		A		M_NSYS			A		M_QUAL			A		M_SDAT			A	
M_SREL		L	A		M_VDAT			A		T_HMON	P		A		T_NHMN	P		A	
T_TIMS	P		A		TS_FEB	P		A		TS_PAD	P		A		TS_PNH	P		A	
TS_PRH	P		A		TS-TIS	P		A											

Comment [j11]: S-57 Supplement No. 2

Comment [j12]: Extension 6/01

Comment [j13]: Extension 6/01

Comment [j14]: Extension 6/01

Table 2.1 Objects permitted for ENC and their geometric primitives

It is recommended that linear spatial features (curves and curves forming area boundaries) should not be encoded at a point density greater than 0.3mm at the optimum intended display scale for the data.

Linear geometry between two explicit coordinates is defined as a loxodromic line on WGS84. Long lines may need to have additional explicit coordinates inserted to cater for the effects of projection change.

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

2.3 Information types

An information type is an identifiable object that can be associated with features in order to carry information particular to the associated features. An example of an information type might be a Chart Note. Information types can also be associated with each other. This could be done where there is further supplementary information that is relevant to the information type or where there is a need to translate the information. For example a primary information object carrying a Chart Note may contain text in English and an associated supplementary information object may carry the same text in German.

The characteristics of information types must be carried by thematic attribute types only.

Comment [j16]: Taken from S-100 Part 3. This is different to the wording in the PS, but same meaning.

2.4 Attributes

Attributes may be of type Enumerated (E), List (L), Float (F), Integer (I), Coded String (A), Free Text (S) or Complex (C) (see clause 2.4.1).

Comment [j17]: Float or Real?

Comment [j18]: Will this do for an abbreviation?

Comment [j19]: What about Date and Time? Are thes just a part of Coded String? Are all the attribute types going to be described in the Product Specification?

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

The binding of attributes to feature types is defined in the Feature Catalogue. Within this document, the allowable list of attributes is included in the description of each feature type. A full description of the attributes that define the feature, as well as the allowable values that may be populated for that attribute, are also included in the feature description. For attributes that may be associated with all feature types, see clause 2.4.4.

Where the value of a non-mandatory attribute is not known, the attribute should not be populated (i.e. not included in the data set).

2.4.1 Attribute types

Each attribute is assigned to one of 7 types:

Comment [j20]: ??? Or should sub-attributes also be inserted as a type of attribute?

E Enumerated. The expected input is a number selected from a list of pre-defined attribute values. Exactly one value must be chosen.

L List. The expected input is a list of one or more numbers selected from a list of pre-defined attribute values. Where more than one value is used, they must normally be separated by commas but in special cases slashes ("/") may be used.

> Note: In some cases, dependency exists between different attributes of a given feature e.g. a bridge (**BRIDGE**) may have the values 'concreted' and 'iron/steel' for the attribute NATCON (Nature of Construction) and the values 'red' and 'green' for the attribute COLOUR. Even if it is known that the concreted part of the bridge is red and the iron/steel part is green, the Feature Catalogue provides no means of indicating this relationship. However, such relationships may be formalized for a given application in which case the relationship must be described in the appropriate Product Specification (see S-57 Appendix B).

F Float. The expected input is a floating point numeric value with defined range, resolution, units and format.

I Integer. The expected input is an integer numeric value with defined range, units and format.

A Coded String. The expected input is a string of ASCII characters in a predefined format.

S Free text. The expected input is a free-format alphanumeric string. It may be a file name which points to a text or graphic file.

C Complex: The expected input is the values populated for a pre-defined list of sub-attributes. Sub-attributes may be any of the above attribute types.

2.4.2 Mandatory attributes

Within this document, mandatory attributes ((M) or (m)) are identified in the description of each feature type. For easy reference, Table 2.2 below summarises the mandatory attributes for each feature type:

Object Class	Attributes						
ADMARE	JRSDTN						
ARCSLN	NATION						
ASLXIS	NATION						
BCNCAR	BCNSHP	CATCAM	COLOUR				
BCNISD	BCNSHP	COLOUR					
BCNLAT	BCNSHP	CATLAM	COLOUR				
BCNSAW	BCNSHP	COLOUR					
BCNSPP	BCNSHP	CATSPM	COLOUR				
BERTHS	OBJNAM						
BOYCAR	BOYSHP	CATCAM	COLOUR				
BOYINB	BOYSHP	COLOUR					
BOYISD	BOYSHP	COLOUR					
BOYLAT	BOYSHP	CATLAM	COLOUR				
BOYSAW	BOYSHP	COLOUR					
BOYSPP	BOYSHP	CATSPM	COLOUR				
BRIDGE	over navigable water : other cases:		CATBRG none	non-opening : opening : opening bridges with limited clearance when open :			VERCLR VERCCL VERCOP
CBLOHD	over navigable water : other cases :		VERCSA none	or if this is unknown :		VERCLR	
CONVYR	over navigable water : other cases :		VERCLR none				
CONZNE	NATION						
COSARE	NATION						
CTNARE	at least one of :		INFORM	TXTDSC			
CURENT	CURVEL	ORIENT					
CUSZNE	NATION						
DAYMAR	COLOUR	TOPSHP					
DEPARE	DRVAL1	DRVAL2					
DEPCNT	VALDCO						

Comment [j21]: S-57 Supplement No. 2

Comment [j22]: MD8 – 1.Co.22 and 1.Cl.29

Object Class	Attributes						
DRGARE	DRVAL1						
DWRTCL	ORIENT	TRAFIC	CATTRK				
DWRTPT	ORIENT	TRAFIC	DRVAL1				
EXEZNE	NATION						
FERYRT	CATFRY						
FOGSIG	CATFOG						
FSHZNE	NATION						
GATCON	if navigable at compilation scale :			HORCLR			
HRBFAC	CATHAF						
ICEARE	CATICE						
LIGHTS	all lights, except air obstruction light or fog detector light if it is an air obstruction light or fog detector light : if it is a sector light : if it is not a fixed light, in addition : if it is directional, or moiré effect :				COLOUR CATLIT SECTR1 SIGPER ORIENT	LITCHR SECTR2 SIGGRP	
LITFLT	COLOUR						
LITVES	COLOUR						
LNDELV	ELEVAT						
LNDMRK	CATLMK	CONVIS					
LNDRGN	at least one of :		CATLND	OBJNAM			
LOCMAG	VALLMA						
MAGVAR	RYRMGV	VALACM	VALMAG				
MARCUL	WATLEV	at least one of:		VALSOU	HEIGHT		
MORFAC	CATMOR						
NAVLNE	CATNAV	ORIENT					
NEWOBJ	CLSDEF	CLSNAM	at least one of:		INFORM	TXTDSC	
OBSTRN	WATLEV	at least one of:		VALSOU	HEIGHT		
PIPOHD	over navigable water : other cases :		VERCLR none				
PRCARE	at least one of :		INFORM	TXTDSC			
PRDARE	CATPRA						
PYLONS	CATPYL						
RADLNE	ORIENT						
RCRTCL	CATTRK						
RCTLPT	ORIENT						
RDOCAL	ORIENT	TRAFIC					

Comment [j23]: Amended from S-57. Should VALSOU be mandatory if the MARCUL is always dry? Suggest be treated same as OBSTRN.

Comment [j24]: MD8 – 2.Co.8

Object Class	Attributes						
RECTRC	ORIENT	TRAFIC	CATTRK				
RESARE	at least one of :		CATREA	RESTRN			
RTPBCN	CATRTB						
SBDARE	at least one of :		NATSUR	NATQUA			
SEAARE	at least one of :		CATSEA	OBJNAM			
SISTAT	CATSIT						
SISTAW	CATSIW						
SMCFAC	CATSCF						
STSLNE	NATION						
SWPARE	DRVAL1						
TESARE	NATION						
TOPMAR	TOPSHP						
TSSLPT	ORIENT	except when the lane part is a junction					
TWRTPT	ORIENT	TRAFIC					
UWTROC	VALSOU	WATLEV					
VEGATN	CATVEG						
WATTUR	CATWAT						
WRECKS	WATLEV	at least one of :		CATWRK	VALSOU		
M_ACCY	POSACC						
M_COVR	CATCOV						
M_CSCL	CSCALE						
M_HOPA	HORDAT	SHIPAM					
M_NSYS	MARSYS or ORIENT						
M_QUAL	CATZOC						
M_SDAT	VERDAT						
M_VDAT	VERDAT						
T_TIMS	TIMEND	TIMSTA	T_HWLW				
T_NHMN	T_MTOD	T_THDF					
T_HMON	T_MTOD	T_VAHC					
TS_FEB	CAT_TS	CURVEL	ORIENT				
TS_PAD	TS_TSP						
TS_PNH	T_MTOD	T_THDF					
TS_PRH	T_MTOD	T_VAHC					
TS_TIS	TIMEND	TIMSTA	TS_TSV	T_TINT			

Comment [j25]: MD8 – 1.Co.23 and 1.Cl.30

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 (M), while "conditional" mandatory attributes are identified with (m). "Conditional" mandatory attributes are indicated in Table 2.2 above by the following additional text:

over navigable water	for **BRIDGE**, **CBLOHD**, **CONVYR**, **PIPOHD**
at least one of	for **CTNARE**, **LNDRGN**, **OBSTRN**, **RESARE**, **SBDARE**, **SEAARE**, **WRECKS**
if navigable at….	for **GATCON**
if it is…..	for **LIGHTS**
if under water	for **MARCUL**
except when…..	for **TSSLPT**
….. or …..	for **M_NSYS**

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 **SBDARE**, the mandatory attributes are *at least one of* NATSUR or NATQUA – if NATSUR is known and NATQUA is not known, then NATQUA must not be populated with an empty (null) value, as it is not mandatory in this case.

NOTE 2: The attribute COLPAT is mandatory for any feature (except **LIGHTS**) that has more than one value populated for the attribute COLOUR.

Comment [j26]: AU S-57 Encoding Guide

2.4.3 Missing attribute values

In a base data set (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 data set (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 data set, or
- that an unknown value is to be inserted if the attribute was not present in the original data set.

2.4.4 Textual information

The attributes INFORM, NINFOM, TXTDSC and NTXTDS must not be used when it is possible to encode the information by means of any other attribute.

INFORM and NINFOM contain information as text, whereas TXTDSC and NTXTDS encode the name of an external file.

The text contained in INFORM and NINFOM is ASCII text. Formatting characters (C0 as defined in S-57 Part 3, Annex B) are prohibited. INFORM and NINFOM should generally be used for short notes (e.g. caution notes from paper charts), or to transfer information which cannot be encoded by other attributes, or to give more detailed information about a feature.

The text files referenced by TXTDSC and NTXTDS must be ASCII 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.

2.4.5 Attributes associated with all feature types

The following attributes may be associated with all geo features in an ENC:

2.4.5.1 Information

S-101 Attribute: INFORM

Attribute type: (S)

IHO Definition: Textual information about the feature.

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 INFORM. If formatted text is required, then the attribute TXTDSC must be used.

2.4.5.2 Pictorial representation

S-101 Attribute: PICREP

Attribute type: (S)

IHO Definition: Indicates whether a pictorial representation of the object is available.

Indication: The string encodes the file name of an external graphic file (pixel/vector).

Remarks:
- The "pictorial representation" could be a drawing or a photo.

2.4.5.3 Recording date

S-101 Attribute: RECDAT

Attribute type: (A)

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 months (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**)

Comment [j27]: MD8 – 4.Cl.10 and 4.Co.12. Should this be included for this attribute?

Example: **19930112** for 12 January 1993 as recording date.

Remarks:

2.4.5.4 Recording indication

S-101 Attribute: RECIND

Attribute type: (A)

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 Seeschiffahrt und Hydrographie = DE; US National Imagery and Mapping Agency = U1.

Procedure (c4): Digitised = digi
Scanned = scan

Alpha/numeric input = alph

Format: **c2**,**c2**,**c4**

Example: **DK,D1,digi**

Remarks:

2.4.5.5 Scale minimum

S-101 Attribute: SCAMIN

Attribute type: (I)

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 SCAMIN 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 SCAMIN is used.

Remarks:

- SCAMIN only affects the display of a feature on an ECDIS, not its presence in the SENC.
- If SCAMIN is not encoded, the feature is displayed at all scales.
- Where SCAMIN is used, it must always be set to a scale less (i.e. to a smaller scale) than or equal to the optimum 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, SCAMIN must not be encoded on Group 1 and Meta features.
- If the same feature exists in cells of different optimum display scales, the same SCAMIN value must be assigned to each occurrence of the feature.

INSERT S-65 INFORMATION ON SCAMIN HERE??????

2.4.5.6 Source date

S-101 Attribute: SORDAT

Attribute type: (A)

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 months (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**)

Comment [j28]: MD8 – 4.Cl.10 and 4.Co.12.

Example: **19820506** for 6 May 1982 as source date.

Remarks:

2.4.5.7 Source indication

S-101 Attribute: SORIND

Attribute type: (A)

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 Seeschiffahrt 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 = reprt

ID-Code (c...): e.g. Code of paper chart

Format: **c2**,**c2**,c5,c...

Example: **DK,D1,graph,chart196**

Remarks:

2.4.5.8 Textual description

S-101 Attribute: TXTDSC

Attribute type: (S)

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 TXTDSC.

Comment [j29]: MD8 – 1.Cl.22 and 1.Co.15.

2.4.6 National language attributes

2.4.6.1 Information in national language

S-101 Attribute: NINFOM

Attribute type: (S)

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.

Comment [j30]: MD8 – 1.Cl.23 and 1.Co.16.

- No formatting of text is possible within NINFOM. If formatted text is required, then the attribute NTXTDS must be used.

2.4.6.2 Object name in national language

S-101 Attribute: NOBJNM

Attribute type: (S)

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 an object in the specified national language.

2.4.6.3 Pilot district in national language

S-101 Attribute: NPLDST

Attribute type: (S)

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.

2.4.6.4 Textual description in national language

S-101 Attribute: NTXTDS

Attribute type: (S)

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 NTXTDS.

Comment [j31]: MD8 – 1.Cl.24 and 1.Co.17.

2.4.7 Spatial attributes

Some attributes qualify the location of an object, as opposed to defining the characteristics of the individual object itself.

Attributes specifying the accuracy and quality of a position (x,y - coordinates) and the reference datum for horizontal measurement are considered to be attributes of spatial objects.

Within a data set encoded according to S-57, the attributes of spatial objects are held in the Spatial Record Attribute field (refer to S-57 Part 3).

2.4.7.1 Positional accuracy

S-101 Attribute: POSACC

Attribute type: (F)

IHO Definition: The best estimate of the accuracy of a position.

Minimum value: 0

Expected input: The expected input is the maximum of the two-dimensional error. The error is assumed to be positive and negative. The plus/minus character must not be encoded.

Unit: Defined in the PUNI subfield of the DSPM record, e.g. metre (m)

Resolution: 0·1m or 0.1mm

Format: xxxx.x

Example: **25** for an error of 25 metres

2.4.7.2 Quality of position

S-101 Attribute: QUAPOS

Attribute type: (E)

IHO Definition:

Expected input:
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

1) **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, Edition 5; 5195, & IHO Chart Specifications, M-4, 175.2).

2) **Unsurveyed**

   IHO Definition: Survey data is does not exist or is very poor. (Adapted from IHO Dictionary – S-32, Edition 5; 5732).

3) **Inadequately surveyed**

   IHO Definition: Position data is of a very poor quality. (Adapted from IHO Dictionary – S-32, Edition 5; 5732).

4) **Approximate**

   IHO Definition: A position that is considered to be less than third-order accuracy, but is generally considered to be within 30·5 metres of its correct geographic location. Also may apply to a feature whose position does not remain fixed. (Adapted from IHO Dictionary – S-32, Edition 5; 213, 3967, & IHO Specifications, M-4, 424.1).

5) **Position doubtful**

IHO Definition: A feature whose position has been reported but which is considered to be doubtful.

6) **Unreliable**

IHO Definition: A feature's position obtained from questionable or unreliable data.

7) **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..

8) **Reported (not confirmed)**

IHO Definition: A feature whose position has been reported and its position has not been confirmed.

9) **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, Edition 5; 3960).

10) **Precisely known**

IHO Definition: A position that is of a known value, such as the position of an anchor berth or other defined feature..

11) **Calculated**

IHO Definition: A position that is computed from data.

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

X.X Clause heading

IHO Definition: **FEATURE NAME:** Definition

Graphic	S-101 Feature	S-101 * Attribute	Allowable Encoding Value **	Attrib. Type
Real World Example if real world instance(s) of the feature. *Paper Chart Symbol* Example(s) of paper chart equivalent symbology for the feature. *ECDIS Symbol* Example(s) of ECDIS symbology for the feature.	**XXXXXX** (P, L, A) Feature acronym, and allowable geometric primitive; P = point L = line A = area	XXXXXX (A) Attribute name Attribute acronym, obligation (A) and name. Obligation; M = mandatory m = mandatory (conditional) O = optional For conditional mandatory attributes, see clause X.X.	This section lists the allowable encoding values for S-101. This may be a list of enumerate values, or a description of the attribute. Further information about the attribute is may be available in following rows.	Indicates the type of attribute. See clause X.X.

Attribute name: IHO Definition: Attribute definition.

Extended information related to the attributes listed in the "S-101 Attribute" row above. This may, depending on the attribute type, consist of extended information, including definitions, of allowable enumerate values; or a fuller description of the construction of text strings, units and resolution for integer and floating point values, and format (including mandatory requirements) and examples of encoding. Additional remarks regarding the attribute may also be included.

INT 1 Reference: The INT 1 location(s) of the feature – by INT1 Section and Section Number.

Sub-clause heading (see S-4 – B-XXX.X)

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.

Meta/Geo feature: Feature name (**XXXXXX**)
Attributes: XXXXXX XXXXXX XXXXXX ……. Full list of attributes allowable for the feature. These attributes are listed in the order of Attributes_A, followed by Attributes_B, then Attributes_C.

Specific instructions to encode the feature.

Remarks:

Distinction:

* S-101 Attribute: This column does not show the full list of allowable attributes for the feature. Atttributes included in this column include all Enumerated (E) and List (L) attributes allowable for the feature, and any other specific defining attributes for the feature.

** For (E) and (L) 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 the relevant IHO Register.

3 ENC Metadata

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

These meta features are in the following list:

M_COVR: The meta feature **M_COVR** must provide an exhaustive, non-overlapping coverage of the whole cell. See clause X.X.

M_NSYS: The meta feature **M_NSYS**, with the attribute MARSYS (to indicate the system of navigational marks), must provide an exhaustive non-overlapping coverage of the part of the cell containing data. However, other **M_NSYS** features with the attribute ORIENT (to indicate a local direction of buoyage) may overlap these objects. See clause X.X.

M_QUAL: The meta feature **M_QUAL** 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 cell containing depth data or bathymetry must be covered by one or more **M_QUAL** features, which must not overlap. See clause X.X.

3.1 Accuracy of data

IHO Definition: **ACCURACY OF 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.

Graphic	S-101 Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**M_ACCY** (A)	POSACC (M) Positional accuracy	Unit: Defined in the PUNI subfield of the DSPM record, e.g. metre (m) Resolution: 0·1m or 0.1mm Format: xxxx.x Example: **25** for an error of 25 metres	F

Positional accuracy: IHO Definition: The best estimate of the accuracy of a position.

INT 1 Reference:

3.1.1 Accuracy of non-bathymetric data

The meta feature **M_ACCY** 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.

Meta feature: Accuracy of data (**M_ACCY**)
Attributes: POSACC INFORM NINFOM NTXTDS TXTDSC RECDAT RECIND SORDAT SORIND

The attributes QUAPOS and POSACC may be applied to any spatial feature, in order to qualify the location of a feature.

QUAPOS and POSACC must not be applied to the spatial feature of any geo feature if they are identical to the QUAPOS and POSACC values of the underlying meta object.

QUAPOS gives qualitative information, whereas POSACC gives quantitative information.

POSACC on the **M_ACCY** applies to non-bathymetric data situated within the area, while QUAPOS or POSACC on the associated spatial features, qualifies the location of the **M_ACCY** feature itself.

Meta features **M_ACCY** and **M_QUAL** should not overlap.

Remarks:

Distinction: Quality of data; survey reliability.

3.2 Compilation scale of data

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.

Graphic	S-101 Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**M_CSCL** (A)	CSCALE (M) Compilation scale		I

Compilation scale: IHO Definition: The scale at which the data was originally compiled.

Indication: The modulus of the scale is indicated, that is 1:75 000 is encoded as 75000.

Unit: none
Resolution: 1

Minimum value: 0

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" (**M_CSCL**) which is used to define polygons of equal compilation scale. CSCALE should therefore not be confused with the attributes SCAMIN and SCAMAX.

INT 1 Reference:

3.2.1 Compilation scale

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

If the compilation scale for an area is different to the value given in the CSCL subfield for the data set, it must be encoded using the meta object **M_CSCL**. The areas covered by these meta objects must not overlap.

Meta feature: Compilation scale of data (**M_CSCL**)
Attributes: CSCALE INFORM NINFOM NTXTDS TXTDSC RECDAT RECIND SORDAT SORIND

Remarks:
- The compilation scale provides the reference value for the overscale indication on an ECDIS.

Distinction:

3.3 Coverage

IHO Definition: **COVERAGE**. A geographical area that describes the coverage and extent of spatial objects.

Graphic	S-101 Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**M_COVR** (A)	CATCOV (M) Category of coverage	1 : coverage available 2 : no coverage available	E

Category of coverage: IHO Definition:

1) **Coverage available**

   IHO Definition: Continuous coverage of spatial objects is available within this area.

2) **No coverage available**

   IHO Definition: An area containing no spatial objects.

INT 1 Reference:

3.3.1 Coverage

Meta feature: Coverage (**M_COVR**)
Attributes: CATCOV INFORM NINFOM RECDAT RECIND SORDAT SORIND

Remarks:
- This meta feature is intended to support an indication of coverage.

Distinction:

3.4 Horizontal datum shift parameters

IHO Definition: **HORIZONTAL DATUM SHIFT PARAMETERS**. An area within which a uniform shift exists between a specific geodetic datum and the datum of the data within this area.

Graphic	S-101 Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**M_HOPA** (A)	HORDAT (M) Category of coverage	1 : WGS 72 2 : WGS 84 3 : European 1950 4 : Potsdam Datum 5 : Adindan 6 : Afgooye 7 : Ain el 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 1971 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 : Herat North 47 : Hjorsey 1955 48 : Hong Kong 1963 49 : Hu-Tzu-Shan	E

			50 : Indian 51 : Indian 1954 52 : Indian 1975 53 : Ireland 1965 54 : ISTS 061 Astro 1968 55 : ISTS 073 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 : Observatorio Meteorologico 1939 77 : Old Egyptian 1907 78 : Old Hawaiian 79 : Oman 80 : Ordnance 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 1956 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 1959 114 : Pulkovo 1942 115 : S-42 (Pulkovo 1942) 116 : S-JYSK 117 : Voirol 1950 118 : Average Terrestrial System 1977 119 : Compensation Géodésique du Québec 1977 120 : Finnish (KKJ) 121 : Ordnance Survey of Ireland 122 : Revised Kertau 123 : Revised Nahrwan 124 : GGRS 76 (Greece) 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	
		SHIPAM (M) Shift parameters	See below for description and example of formatted string value	A

Category of coverage: IHO Definition:

Remarks:

- The attribute HORDAT is only permitted for the meta feature **M_HOPA**.
- 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.

Shift parameters: IHO Definition: Latitude and longitude offsets required to shift a position from one geodetic datum to another.

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 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.
- 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 INFORM or NINFORM.

INT 1 Reference:

3.4.1 Horizontal datum

The horizontal datum must be unique in a data set and must be WGS84. It must be encoded in the “Horizontal Geodetic Datum” [HDAT] subfield of the “Data Set Parameter” [DSPM] field.

The meta feature **M_HOPA** may be used to provide the shift from another horizontal datum to WGS84 (see ENC Product Specification clause X.X).

Meta feature: Horizontal Datum (**M_HOPA)**
Attributes: HORDAT - contain the original horizontal datum of the data
SHIPAM INFORM NINFOM NTXTDS SCAMIN TXTDSC
RECDAT RECIND SORDAT SORIND

Where data has been transformed to WGS84 from another datum, the producing authority may wish to indicate the accuracy of the transformation. If so, it must be done using the attribute INFORM on the meta feature **M_QUAL**.

Remarks:

Distinction:

3.5 Nautical publication information

IHO Definition: **NAUTICAL PUBLICATION INFORMATION**. Used to relate additional nautical information or publications to the data.

Graphic	S-101 Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**M_NPUB** (P, A)	PICREP (O) Pictorial representation		S
		PUBREF (O) Publication reference		S
		TXTDSC (O) Textual description		S

Pictorial representation: IHO Definition: Indicates whether a pictorial representation of the object is available.

Indication: The string encodes the file name of an external graphic file (pixel/vector).

Remarks:
- The "pictorial representation" could be a drawing or a photo.

Publication reference: IHO Definition: A reference to a nautical publication.

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**

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 TXTDSC.

Comment [j32]: MD8 – 1.Cl.22 and 1.Co.15.

INT 1 Reference:

3.5.1 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 **M_NPUB**.

Meta feature: Coverage (**M_NPUB**)
Attributes: INFORM NINFOM NTXTDS PICREP PUBREF TXTDSC
RECDAT RECIND SORDAT SORIND

Remarks:
- References to nautical publications in **M_NPUB**, must be encoded using the attribute PUBREF, and references to external picture files must be encoded using the attribute PICREP.

Distinction:

3.6 Navigational system of marks

IHO Definition: **NAVIGATIONAL SYATEM OF MARKS**. An area within which a specific system of navigational marks applies and/or a common direction of buoyage.

Graphic	S-101 Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol*	**M_NSYS** (A)	MARSYS (m) Marks navigational – System of	1 : IALA A 2 : IALA B 9 : no system 10 : other system	E
ECDIS Symbol		ORIENT (m) Orientation	Unit: Degree (°) – minimum value 0; maximum value 360 Resolution: 0·01° Format: xxx.xX Example: **246.7** for an orientation of 246·7 degrees	F

Marks navigational – System of: IHO Definition:

1) **IALA A**

   IHO Definition: Navigational aids conform to the International Association of Lighthouse Authorities - IALA A system.

2) **IALA B**

   IHO Definition: Navigational aids conform to the International Association of Lighthouse Authorities - IALA B system.

9) **No system**

   IHO Definition: Navigational aids do not conform to any defined system.

10) **Other system**

   IHO Definition: Navigational aids conform to a defined system other than International Association of Lighthouse Authorities -IALA.

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).

INT 1 Reference:

3.6.1 Buoyage systems and direction of buoyage (see S-4 – B-461)

The buoyage system of the data set and, where necessary, the direction of buoyage, must be encoded using the meta feature **M_NSYS**:

Meta feature: Navigational system of marks (**M_NSYS**)
Attributes: MARSYS ORIENT INFORM NINFOM NTXTDS SCAMIN
TXTDSC RECDAT RECIND SORDAT SORIND

All parts of the data set containing data must be covered by **M_NSYS** features, with the attribute MARSYS indicating the buoyage system in operation. **M_NSYS** with a value encoded for MARSYS must not overlap.

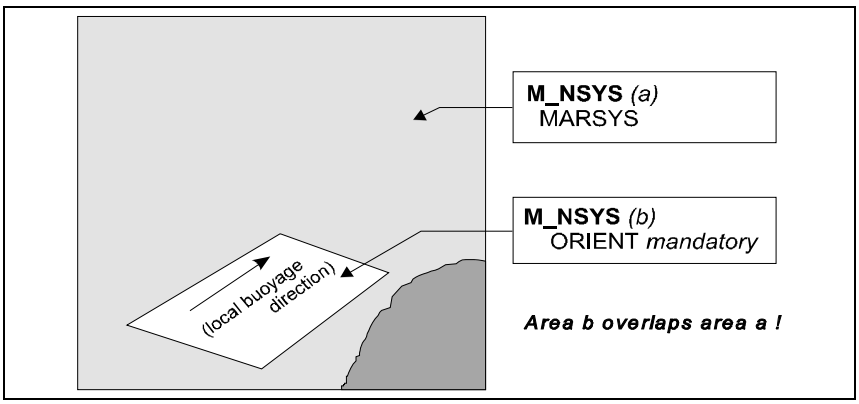
In the following table the symbol '/' indicates that this attribute is not relevant for that particular feature. The table contains the most common examples of coding; other coding combinations are possible. For encoding of buoys, substitute **BOY** for **BCN** in Feature.

Real World Feature	INT 1	Feature	CATCAM	COLOUR	COLPAT	MARSYS
North cardinal beacon	IQ 130.3	**BCNCAR**	*1*	*2,6*	*1*	*1* and *2* (IALA A and B)
East cardinal beacon	IQ 130.3	**BCNCAR**	*2*	*2,6,2*	*1*	*1* and *2* (IALA A and B)
South cardinal beacon	IQ 130.3	**BCNCAR**	*3*	*6,2*	*1*	*1* and *2* (IALA A and B)
West cardinal beacon	IQ 130.3	**BCNCAR**	*4*	*6,2,6*	*1*	*1* and *2* (IALA A and B)
Isolated danger beacon	IQ 130.4	**BCNISD**	/	*2,3,2*	*1*	*1* and *2* (IALA A and B)
Port lateral beacon	IQ 130.1	**BCNLAT**	*1*	*3*	/	*1* (IALA A)
Starboard lateral beacon	IQ 130.1	**BCNLAT**	*2*	*4*	/	*1* (IALA A)
Preferred channel to starboard lateral beacon	IQ 130.1	**BCNLAT**	*3*	*3,4,3*	*1*	*1* (IALA A)
Preferred channel to port lateral beacon	IQ130.1	**BCNLAT**	*4*	*4,3,4*	*1*	*1* (IALA A)
Port lateral beacon	IQ130.1	**BCNLAT**	*1*	*4*	/	*2* (IALA B)
Starboard lateral beacon	IQ130.1	**BCNLAT**	*2*	*3*	/	*2* (IALA B)
Preferred channel to starboard lateral beacon	IQ130.1	**BCNLAT**	*3*	*4,3,4*	*1*	*2* (IALA B)
Preferred channel to port lateral beacon	IQ130.1	**BCNLAT**	*4*	*3,4,3*	*1*	*2* (IALA B)
Safe water beacon	IQ130.5	**BCNSAW**	/	*3,1 or 1,3*	*2*	*1* and *2* (IALA A and B)
Special purpose beacon	IQ130.6	**BCNSPP**	/	*6*	/	*1* and *2* (IALA A and B)
North cardinal topmark	IQ 130.3	**TOPMAR**	*13*	*2*	/	*1* and *2* (IALA A and B)
East cardinal topmark	IQ 130.3	**TOPMAR**	*11*	*2*	/	*1* and *2* (IALA A and B)
South cardinal topmark	IQ 130.3	**TOPMAR**	*14*	*2*	/	*1* and *2* (IALA A and B)
West cardinal topmark	IQ 130.3	**TOPMAR**	*10*	*2*	/	*1* and *2* (IALA A and B)
Isolated danger topmark	IQ130.4	**TOPMAR**	*4*	*2*	/	*1* and *2* (IALA A and B)
Port lateral topmark	IQ130.1	**TOPMAR**	*5*	*3*	/	*1* (IALA A)
Starboard lateral topmark	IQ130.1	**TOPMAR**	*1*	*4*	/	*1* (IALA A)
Port lateral topmark	IQ130.1	**TOPMAR**	*5*	*4*	/	*2* (IALA B)
Starboard lateral topmark	IQ130.1	**TOPMAR**	*1*	*3*	/	*2* (IALA B)
Safe water topmark	IQ130.1	**TOPMAR**	*3*	*3*	*2*	*1* and *2* (IALA A and B)

Special purpose topmark	IQ130.1	**TOPMAR**	*7*	*6*	*/*	*1* and *2* (IALA A and B)

Within a data set, 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 **M_NSYS** area features, with the attribute ORIENT indicating the direction of buoyage (MARSYS must not be encoded for these features). **M_NSYS** features with a value encoded for ORIENT must not overlap, but in areas where local buoyage directions apply, **M_NSYS** with a value encoded for ORIENT may overlap **M_NSYS** with a value encoded for MARSYS (see Figure below).

Individual buoys and beacons may not be part of the general buoyage system. This should be encoded using MARSYS on these buoy and beacon objects.



Buoyage system and direction

Remarks:

Distinction:

3.7 Quality of bathymetric data

IHO Definition: **QUALITY OF BATHYMETRIC DATA**. An area within which a uniform assessment of the quality of the bathymetric data exists.

Graphic	S-101 Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**M_QUAL** (A)	CATZOC (M) Category of zone of confidence in data	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)	E

Category of coverage: IHO Definition:

1	2	3		4	5
ZOC[1]	Position Accuracy[2]	Depth Accuracy[3]		Seafloor Coverage	Typical Survey Characteristics[5]
A1	± 5 m + 5% depth	=0.50 + 1%d		Full area search undertaken. Significant seafloor features detected[4] and depths measured.	Controlled, systematic survey[6] high position and depth accuracy achieved using DGPS or a minimum three high quality lines of position (LOP) and a multibeam, channel or mechanical sweep system.
		Depth (m)	Accuracy (m)		
		10 30 100 1000	± 0.6 ± 0.8 ± 1.5 ± 10.5		
A2	± 20 m	= 1.00 + 2%d		Full area search undertaken. Significant seafloor features detected[4] and depths measured.	Controlled, systematic survey[6] achieving position and depth accuracy less than ZOC A1 and using a modern survey echosounder[7] and a sonar or mechanical sweep system.
		Depth (m)	Accuracy (m)		
		10 30 100 1000	± 1.2 ± 1.6 ± 3.0 ± 21.0		
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[7], but no sonar or mechanical sweep system.
		Depth (m)	Accuracy (m)		
		10 30 100 1000	± 1.2 ± 1.6 ± 3.0 ± 21.0		
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 30 100 1000	± 2.5 ± 3.5 ± 7.0 ± 2.0		

D	worse than ZOC C	Worse Than ZOC C	Full area search not achieved, large depth anomalies may be expected.	Poor quality data or data that cannot be quality assessed due to lack of information.
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:

[1] 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' (M_QUAL) sub-attributes as follows:

a) Positional Accuracy (POSACC) and Sounding Accuracy (SOUACC) 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 that ZOC B; however, if the position accuracy was, for instance, ± 15 metres, the sub-attribute POSACC could be used to indicate this).

b) Swept areas where the clearance depth is accurately known but the actual seabed depth is not accurately known may be accorded a 'higher' ZOC (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 (DRVAL1) may be used to specify the swept depth. The position accuracy criteria apply to the boundaries of swept areas.

c) SURSTA, SUREND and TECSOU may be used to indicate the start and end dates of the survey and the technique of sounding measurement.

[2] Position Accuracy of depicted soundings at 95% CI (2.45 sigma) with respect to the given datum. It is the cumulative error and includes survey, transformation and digitizing errors etc. Position accuracy need not be rigorously computed for ZOCs B, C and D but may be estimated based on type of equipment, calibration regime, historical accuracy etc.

[3] Depth accuracy of depicted soundings = a + (b*d)/100 at 95% CI (2.00 sigma), where d = depth in metres at the critical depth. Depth accuracy need not be rigorously computed for ZOCs B, C and D but may be estimated based on type of equipment, calibration regime, historical accuracy etc.

[4] Significant seafloor features are defined as those rising above depicted depths by more than:

	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.

[5] Typical Survey Characteristics - These descriptions should be seen as indicative examples only.

[6] Controlled, systematic surveys (ZOC A1, A2 and B) - surveys comprising planned survey lines, on a geodetic datum that can be transformed to WGS 84.

[7] Modern survey echosounder - a high precision single beam depth measuring equipment, generally including all survey echosounders designed post 1970.

Comment [j33]: S-57 Supplement No. 2

INT 1 Reference:

3.7.1 Quality, reliability and accuracy of bathymetric data

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

- the meta feature **M_QUAL** for an assessment of the quality of bathymetric data;
- the meta feature **M_SREL** for additional information about the survey;
- the attributes QUASOU, SOUACC and TECSOU on groups of soundings or individual features;
- the attributes POSACC and QUAPOS on the spatial features (see clause X.X).

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

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

For individual features (wrecks, obstructions etc), or small groups of soundings, QUASOU, SOUACC and TECSOU may be used to provide additional information about quality and accuracy.

The meta feature **M_QUAL** 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 cell containing depth data or bathymetry must be covered by one or more **M_QUAL**, which must not overlap.

Meta feature: Quality of data (**M_QUAL**)

Attributes: CATZOC DRVAL1
DRVAL2 - the maximum depth to which the quality information applies
POSACC SOUACC SURSTA SUREND TECSOU INFORM
NINFOM NTXTDS TXTDSC RECDAT RECIND SORDAT
SORIND

Remarks:

- Where **M_QUAL** areas are encoded over land, CATZOC should be set to 6 (unassessed).
- A CATZOC category indicates that the depths encoded within a **M_QUAL** area meet the minimum criteria described in the CATZOC definition table. A CATZOC category may be further sub-divided by specifying depth and positional accuracy, and sounding technique, using the attributes POSACC, SOUACC and TECSOU, within separate **M_QUAL** areas.
- DRVAL1 must only be used on a **M_QUAL** feature where a swept area occupies the entire **M_QUAL** area.
- DRVAL2 must only be used on a **M_QUAL** feature to specify the maximum depth to which the CATZOC category applies. When DRVAL2 is specified, the CATZOC category applies only to depths equal to or shoaler than DRVAL2. No quality information is provided for depths deeper than DRVAL2.
- POSACC must only be used on a **M_QUAL** feature to specify a higher positional accuracy of the depths than the CATZOC category indicates. When DRVAL1 is specified, POSACC must not be used - there is no positional accuracy information provided for any underlying depths in this circumstance.
- SOUACC must only be used on a **M_QUAL** feature to specify a higher accuracy of the depths than the CATZOC category indicates. When DRVAL1 is specified, SOUACC refers only to the accuracy of the swept depth defined by DRVAL1 - there is no depth accuracy information provided for any underlying depths in this circumstance.
- When the **M_QUAL** area contains soundings of two or more different techniques, the attribute TECSOU must not be used.
- When the **M_QUAL** area contains data from only one survey, the date of survey, if required, must be specified using the attribute SUREND. When the **M_QUAL** area contains data from two or more surveys, the date of the oldest survey, if required, must be specified using the attribute SURSTA, and the date of the most recent survey, if required, must be specified using SUREND.
- Additional quality information may be given using the meta feature **M_SREL**.
- When **M_QUAL** and the meta feature **M_ACCY** are encoded in a cell, they should not overlap. When both **M_QUAL** and **M_ACCY** features are used in a cell, the area covered by these features should equal the area of data coverage for the cell.
- POSACC on the **M_QUAL** applies to bathymetric data situated within the area, while QUAPOS or POSACC

on the associated spatial features, qualifies the location of the **M_QUAL** feature itself.

Distinction: Accuracy of data; survey reliability.

3.8 Sounding datum

IHO Definition: **SOUNDING DATUM**. An area of uniform sounding datum.

Graphic	S-101 Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**M_SDAT** (A)	VERDAT (M) Vertical datum	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)~~	E

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, Edition 5; 3150).

2) **Mean lower low water springs**

   IHO Definition: (MLLWS) - the average height of lower low water springs at a place. (IHO Dictionary – S-32, Edition 5; 3146).

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, Edition 5; 3156).

4) **Lowest low water**

IHO Definition: An arbitrary level conforming to the lowest tide observed at a place, or somewhat lower.

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, Edition 5; 3147).

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 ± 0.3m 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, Edition 5; 2427).

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 ± 0.3m 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, Edition 5; 3145).

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.

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 ± 0.3m 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 ± 0.3m from that of mean lower low water (MLLW). (Hydrographic Service, Royal Australian Navy).

19) **Approximate mean sea level**

IHO Definition: An arbitrary level, usually within ± 0.3m from that of mean sea level (MSL). (Hydrographic Service, Royal Australian Navy).

22) **Equinoctial spring low water**

IHO Definition: The level of low water springs near the time of an equinox.

23) **Lowest astronomical tide**

IHO Definition: (LAT) - the lowest tide level which can be predicted to occur under average meterological conditions and under any combination of astronomical conditions. (IHO Dictionary – S-32, Edition 5; 2936).

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.

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.

26) **Mean water level**

IHO Definition: The average of all hourly water levels over the available period of record.

27) **Lower low water large tide**

IHO Definition: (LLWLT) - the average of the lowest low waters, one from each of 19 years of observations.

INT 1 Reference:

3.8.1 Sounding datum

Sounding datum information is encoded in the data set metadata or by the meta feature **M_SDAT**, and must be constant over large areas. The values encoded in the attributes VALSOU, DRVAL1, DRVAL2 and VALDCO, and the sounding values encoded in **SOUNDG** features (positive values down), are referenced to this datum.

The default value for the entire data set must be given in the "Vertical Datum" [VDAT] subfield of the "Data Set Parameter" [DSPM] field.

If the sounding datum for an area is different to the value given in the SDAT subfield for the data set, it must be encoded using **M_SDAT**. The areas covered by these meta features must not overlap.

Meta feature: Sounding datum (**M_SDAT**)
Attributes: VERDAT INFORM NINFOM NTXTDS TXTDSC RECDAT
RECIND SORDAT SORIND

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 **MARCUL**, **OBSTRN** and **WRECKS**, but only where the value of VALSOU is known; and **BERTHS**, **CBLSUB**, **DWRTCL**, **DWRTPT**, **DRGARE**, **DRYDOC**, **FAIRWY**, **FLODOC**, **GATCON**, **PIPSOL**, **RCRTCL**, **RECTRC**, **SWPARE**, **TWRTPT** and **M_QUAL** but only if the value of DRVAL1 and/or DRVAL2 is known.

Comment [j34]: These clauses need to be sorted out in regard to how vertical and sounding datums are going to work in S-101.

Remarks:

Distinction: Vertical datum.

3.9 Survey reliability

IHO Definition: **SURVEY RELIABILITY**. An area within which a uniform assessment of the reliability of source survey information exists.

Graphic	S-101 Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**M_SREL** (L, A)	QUAPOS (O) Quality of position	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	E
		QUASOU (O) Quality of sounding measurement	1 : depth known ~~2 : 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~~	L
		SCVAL1 (O) Scale value one		I
		SCVAL2 (O) Scale value two		I
		SDISMX (O) Sounding distance - maximum	Unit: Defined in the HUNI subfield of the DSPM record or the HUNITS attribute of the M_UNIT meta feature: metre. Resolution: 1m Format: xxxx Example: **150** for a maximum spacing of 150 metres	I
		SDISMN (O) Sounding	Unit: Defined in the HUNI subfield of the DSPM record or	I

		distance - minimum	the HUNITS attribute of the M_UNIT meta feature: metre. Resolution: 1m Format: xxxx Example: **50** for a maximum spacing of 50 metres	
		SURATH (O) Survey authority		S
		SUREND (O) Survey date - end	See below for description and example of formatted string value.	A
		SURSTA (O) Survey date - end	See below for description and example of formatted string value.	A
		SURTYP (O) Survey type	1 : reconnaissance/sketch survey 2 : controlled survey 4 : examination survey 5 : passage survey 6 : remotely sensed	L

Quality of position: IHO Definition:

1) **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, Edition 5; 5195, & IHO Chart Specifications, M-4, 175.2).

2) **Unsurveyed**

   IHO Definition: Survey data is does not exist or is very poor. (Adapted from IHO Dictionary – S-32, Edition 5; 5732).

3) **Inadequately surveyed**

   IHO Definition: Position data is of a very poor quality. (Adapted from IHO Dictionary – S-32, Edition 5; 5732).

4) **Approximate**

   IHO Definition: A position that is considered to be less than third-order accuracy, but is generally considered to be within 30·5 metres of its correct geographic location. Also may apply to a feature whose position does not remain fixed. (Adapted from IHO Dictionary – S-32, Edition 5; 213, 3967, & IHO Specifications, M-4, 424.1).

5) **Position doubtful**

   IHO Definition: A feature whose position has been reported but which is considered to be doubtful.

6) **Unreliable**

   IHO Definition: A feature's position obtained from questionable or unreliable data.

7) **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..

8) **Reported (not confirmed)**

IHO Definition: A feature whose position has been reported and its position has not been confirmed.

9) **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, Edition 5; 3960).

10) **Precisely known**

IHO Definition: A position that is of a known value, such as the position of an anchor berth or other defined feature..

11) **Calculated**

IHO Definition: A position that is computed from data.

Quality of sounding measurement: IHO Definition:

1) **Depth known**

IHO Definition: The depth from chart datum to the bottom is a known value.

3) **Doubtful sounding**

IHO Definition: A depth that may be less than indicated. (Adapted from IHO Dictionary – S-32, Edition 5; 4840).

4) **Unreliable sounding**

IHO Definition: A depth that is considered to be an unreliable value.

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, Edition 5; 4848).

Scale value one: IHO Definition: The largest scale for the range of survey scale as used in source diagram information.

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

Scale value two: IHO Definition: The smallest scale for the range of survey scale as used in source diagram information.

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

Sounding distance - maximum: IHO Definition: The maximum spacing of the principal sounding lines of a survey.

Sounding distance - minimum: IHO Definition: The minimum spacing of the principal sounding lines of a survey.

Survey authority: IHO Definition: The authority which was responsible for the survey.

Example:
Hydrographic Service, Royal Australian Navy
Port of Melbourne Authority

Remarks:
- The attribute "survey authority" encodes the name of the source survey authority.

Survey date - end: IHO Definition: The end date of the survey.

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.

Survey date - start: IHO Definition: The start date of the survey.

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.

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, Edition 5; 5219).

2) **Controlled survey**

   IHO Definition: A thorough survey usually conducted with reference to guidelines.

4) **Examination survey**

   IHO Definition: A survey principally aimed at the investigation of underwater obstructions and dangers.

5) **Passage survey**

   IHO Definition: A survey where soundings are acquired by vessels on passage.

6) **Remotely sensed**

   IHO Definition: a survey where features have been positioned and delimited using remote sensing techniques.

INT 1 Reference:

3.9.1 Survey reliability

The survey reliability may be encoded using the meta feature **M_SREL**.

Meta feature:	Coverage (**M_SREL**)					
Attributes:	QUAPOS	QUASOU	SCVAL1	SCVAL2	SDISMX	SDISMN
	SURATH	SUREND	SURSTA	SURTYP	INFORM	NINFOM
	NTXTDS	TXTDSC	RECDAT	RECIND	SORDAT	SORIND

Remarks:

- If the attributes SOUACC and TECSOU are required, they must be encoded on either the meta feature **M_QUAL** or on individual geo features (e.g. **SOUNDG**).
- If it is required to encode details of the survey authority, it must be done using the attribute SURATH, and must not be encoded using the attribute SORIND.
- If a feature has a source different to that given by the underlying **M_SREL**, this other source should be encoded using both the attributes SORIND and SORDAT on the feature, but only if this information is considered to be useful to the mariner.
- QUAPOS on the **M_SREL** applies to bathymetric data situated within the area, while QUAPOS or POSACC on the associated spatial features, qualifies the location of the **M_SREL** feature itself.

Distinction: Accuracy of data; quality of data

3.10 Vertical datum

IHO Definition: **VERTICAL DATUM**. An area of uniform vertical datum.

Graphic	S-101 Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**M_VDAT** (A)	VERDAT (M) Vertical datum	~~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)	E

Vertical datum: IHO Definition:

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, Edition 5; 3156).

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, Edition 5; 3141).

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, Edition 5; 3144).

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, Edition 5; 2251).

19) **Approximate mean sea level**

IHO Definition: An arbitrary level, usually within ± 0.3m 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, Edition 5; 3140).

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.

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.

26) **Mean water level**

IHO Definition: The average of all hourly water levels over the available period of record.

28) **Higher high water large tide**

IHO Definition: (HHWLT) - the average of the highest high waters, one from each of 19 years of observations.

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.

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, Edition 5; 2244).

INT 1 Reference:

3.10.1 Vertical datum

Vertical datum information is encoded in the data set metadata, using the meta feature **M_VDAT**, or by populating the attribute VERDAT on individual geo features. The values encoded in the attributes ELEVAT, HEIGHT, VERCCL, VERCLR, VERCOP and VERCSA (positive values up) are referenced to the specified datum(s). VERDAT 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 data set must be given in the "Vertical Datum" [VDAT] subfield of the "Data Set Parameter" [DSPM] field.

If the vertical datum for an area is different to the value given in the VDAT subfield for the data set, it must be

encoded using **M_VDAT**. The areas covered by these meta features must not overlap.

Meta feature: Vertical datum (**M_VDAT**)
Attributes: VERDAT INFORM NINFOM NTXTDS TXTDSC RECDAT RECIND SORDAT SORIND

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

Various datums are used on paper charts and these datums are used in the same way for 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 data set or **M_VDAT** applies to the first group of the above list. The attribute VERDAT 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 data set metadata or **M_VDAT**.

Remarks:

Distinction: Sounding datum.

4 Positions, Distances, Directions, Compass

4.1 Control Point

IHO Definition: **CONTROL POINT**. A point on the ground where position (horizontal and vertical) is used as a base for a dependent survey. Also referred to as a control station. (IHO Dictionary – S-32, Edition 5; 1026).

Graphic	S-101 Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**CTRPNT** (P)	CATCTR (O) Category of control point	1 : triangulation point 2 : observation spot ~~3 : fixed point~~ ~~4 : benchmark~~ 5 : boundary mark 6 : horizontal control, main station ~~7 : horizontal control, secondary station~~	E

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, Edition 5; 5016, 5646).

2) **Observation spot**

   IHO Definition: A point used by surveyors for determining precise position by astronomical means. (IHO Chart Specifications, S-4).

3) **Fixed point**

   IHO Definition: A point whose position has been accurately determined and plotted. (IHO Chart Specifications, S-4).

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, Edition 5; 462).

5) **Boundary Mark**

   IHO Definition: A marker identifying the location of a surveyed boundary line. (Defence Geos 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).

Comment [j35]: This is where the actual definition is.

Comment [j36]: This definition seems to mean something slightly different to what is in S-32?

Comment [j37]: There is a definition for a "boundary monument" in S-32. What is wrong with that?

INT 1 Reference: B 20-24

4.1.1 Control points (see S-4 – B-304; B-305.1; B-306)

If it is required to encode a control point, it must be done using the feature **CTRPNT**.

Geo feature: Control point (**CTRPNT**)

Attributes:						
	CATCTR	DATEND	DATSTA	ELEVAT	NOBJNM	OBJNAM
	INFORM	NINFOM	NTXTDS	PICREP	SCAMIN	TXTDSC
	RECDAT	RECIND	SORDAT	SORIND		

Control points should only be encoded where there is some significance to the mariner, i.e. the point is prominent or visually conspicuous. Control points of interest mainly to the hydrographic surveyor rather than the mariner should be limited to the largest optimum display scale ENC data or omitted altogether.

Remarks:

Distinction: Beacon, special purpose/general; daymark; land elevation; landmark; topmark.

4.2 Local Magnetic Anomoly

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 anomoly. (IHO Dictionary – S-32, Edition 5; 2874, 2984).

Graphic	S-101 Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**LOCMAG** (P, L, A)	VALLMA (M) Value of local magnetic anomaly	Unit: minute (') Resolution: 0.1' Format: xx.x Example: **180.3** for a deviation of ± 3° 00·3'	F

Comment [j38]: MD8 – 7.Co.21

Value of local magnetic anomaly: IHO Definition: The value of the deviation from the normal magnetic variation.

INT 1 Reference: B 82.1-2

4.2.1 Local magnetic anomaly (see S-4 – B-274)

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 **LOCMAG**.

Geo feature: Local magnetic anomaly (**LOCMAG**)

Attributes: NOBJNM OBJNAM VALLMA INFORM NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND SORDAT SORIND

If the area cannot be defined, the feature should be represented as a point.

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 INFORM (e.g. From -27 degrees to 3 degrees).

Remarks:

- Where the attribute VALLMA contains a value, the deviation is assumed to be positive and negative. The plus/minus character must not be encoded.
- Local magnetic variation should not be encoded unless it varies by more than about 3° from the normal magnetic variation (see 4.3 below) for the area.

Distinction: Magnetic variation.

4.3 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, Edition 5; 3021, 5785).

Graphic	S-101 Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**MAGVAR** (P, L, A)	RYRMGV(M) Reference year for magnetic variation	Unit: Four digit year indication (CCYY) Format: CCYY Example: **2009**	A
		VALACM (M) Value of annual change in magnetic variation	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	F
		VALMAG (M) Value of local magnetic variation	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° 18’ east from the geographic (true) north	F

Reference year for magnetic variation: IHO Definition: The reference calendar year for magnetic variation values.

Value of annual change in magnetic variation: IHO Definition: The annual change in magnetic variation values.

Value of local magnetic variation: IHO Definition: The magnetic variation value.

INT 1 Reference: B 68, 70-71

4.3.1 Magnetic variation (see S-4 – B-261; B-270)

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 **MAGVAR**. As a minimum, updates to the magnetic variation should be supplied to coincide with changes of epoch (i.e. every five years).

Geo feature: Magnetic variation (**MAGVAR**)
Attributes: DATEND DATSTA RYRMGV VALACM VALMAG INFORM
NINFOM SCAMIN RECDAT RECIND SORDAT SORIND

Remarks:

- When populating the attribute VALACM, a positive value, i.e. unsigned, indicates a change in a easterly direction and a negative value indicates a change in a westerly direction.
- When populating the attribute VALMAG, 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

IHO Definition: **COASTLINE**. 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, Edition 5; 858, 4695).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**COALNE** (L)	CATCOA (O) Category of coastline	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	E
		COLOUR (O) 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	L
		CONRAD (O) Conspicuous, radar	1 : radar conspicuous ~~2 : not radar conspicuous~~ ~~3 : radar conspicuous (has radar reflector)~~	E
		CONVIS (O) Conspicuous, visually	1 : visually conspicuous ~~2 : not visually conspicuous~~	E

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. (IHO Chart Specifications, S-4).

2) **Flat coast**

   IHO Definition: A level coast with no obvious topographic features. (IHO Chart Specifications, S-4).

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, Edition 5; 4497).

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, Edition 5; 5059).

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, Edition 5; 4683).

6) **Glacier, seaward end**

IHO Definition: Projecting seaward extension of glacier, usually afloat. Also called glacier tongue. (IHO Dictionary – S-32, Edition 5; 2043).

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, Edition 5; 3064).

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, Edition 5; 5240).

9) **Coral reef**

IHO Definition: A reef, often of large extent, composed chiefly of coral and its derivatives. (IHO Dictionary – S-32, Edition 5; 1063).

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.

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, Edition 5; 4680).

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

5.1.1 Coastline

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

These features form the border of the land area (**LNDARE**) feature.

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

Geo feature: Coastline (**COALNE**)

Attributes:	CATCOA	COLOUR	CONRAD	CONVIS	ELEVAT	NOBJNM
	OBJNAM	INFORM	NINFOM	NTXTDS	PICREP	SCAMIN
	TXTDSC	RECDAT	RECIND	SORDAT	SORIND	

Spatial features associated with coastlines considered to be inadequately surveyed at the optimum display scale

for the ENC data (see S-4 – B-311) should be encoded using spatial attribute QUAPOS = *3* (inadequately surveyed).

If it is required to encode a description of the nature of the coastline, it must be done using the attribute CATCOA. Other area 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.

Remarks:

- **COALNE** must only exist at the boundary of **LNDARE** of type area.
- **COALNE** and **SLCONS** of type line must not overlap. Similarly, **COALNE** should not share an edge with a **SLCONS** of type area having attribute WATLEV undefined or populated with the values *2* (always dry) or *1* (partly submerged at high water), which is covered by **LNDARE**.
- If the seaward edge of a mangrove area is coincident with the coastline, the coastline should be encoded as **COALNE**, with CATCOA = *7* (mangrove). If it is required to encode the area of the mangrove, this must be done using the feature **VEGATN** (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 **COALNE**, and the mangrove area must be encoded as **VEGATN**. See also S-4 - B-312.4. In all cases the spatial feature for the seaward edge of the mangrove should have attribute QUAPOS = *4* (approximate).
- If the seaward edge of a marsh area is coincident with the coastline, the coastline should be encoded as **COALNE**, with CATCOA = *8* (marshy shore), and the coastline's spatial feature should have the attribute QUAPOS = *4* (approximate) for the visible coastline. If it is required to encode the area of the marsh, this must be done using **VEGATN** (see clause X.X).
- If the seaward edge of an encoded saltpan area is coincident with the coastline, it should be encoded using **COALNE**, with CATCOA = *2* (flat coast).
- If the seaward edge of an encoded glacier is coincident with the coastline, this edge should be encoded using **COALNE**, with CATCOA = *6* (glacier (seaward end)).
- Where the source indicates a cliff is coincident with the coastline (see INT1 - C3), a **COALNE** feature, with CATCOA = *1* (steep coast) should be encoded. In such cases, there should be no **SLOTOP** or **SLOGRD** features encoded.

Distinction: Canal bank; lake shore; river bank; shoreline construction.

Comment [j39]: S-58 Test 51.

5.2 Land elevation

IHO Definition: **LAND ELEVATION**. An elevation is the vertical distance of a point or a level, on, or affixed to, the surface of the earth, measured from a specified vertical datum. (Adapted from IHO Dictionary – S-32, Edition 5; 1590).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol*	**LNDELV** (P, L)	ELEVAT (M) Elevation	Unit: Defined in the HUNI subfield of the DSPM record or the HUNITS attribute of the M_UNIT meta feature: metre. Resolution: 0·1m Format: xxx.x Example: **47** for an elevation of 47 metres	F
ECDIS Symbol		CONVIS (O) Conspicuous, visually	1 : visually conspicuous ~~2 : not visually conspicuous~~	E

Elevation: IHO Definition: The altitude of the ground level of an object, measured from a specified vertical datum.

INT 1 Reference: C 10-13; H 20

5.2.1 Height contours, spot heights (see S-4 – B-351 and B-352)

It is assumed that mariners will understand most methods of representation of relief with little difficulty. In general it is assumed that HOs 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:

a. omit all relief representation, except dykes and sea walls;

b. omit all relief representation, except spot heights and cliffs;

c. show relief by contours (and spot heights); or

d. show relief by form lines (and spot heights).

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

Comment [j40]: S-4 text not yet reviewed by CSPCWG.

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

Geo feature: Land elevation (**LNDELV**)
Attributes: CONVIS ELEVAT NOBJNM OBJNAM INFORM NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND SORDAT SORIND

LNDELV features must be covered by a **LNDARE** feature of type area, or a **WRECKS** feature of type area having attribute WATLEV = *1* (partially submerged at high water) or *2* (always dry), or fall on a **LNDARE** feature of type line, or share the geometry of a **LNDARE** of type point or a **WRECKS** feature of type point having attribute WATLEV = *1* (partially submerged at high water) or *2* (always dry).

Comment [j41]: S-58 test 52.

Height contours are associated with line spatial features, whereas spot heights are associated with point spatial features.

Spatial features associated with approximate contours or spot heights should be encoded using the attribute

QUAPOS = *4* (approximate).

Remarks:

- Where it would not be worthwhile to contour ENC data of smaller optimum display scale, form lines (emphasizing a few 'remarkable' hills) and/or spot heights may be used to emphasize individual features.
- Contours should reflect the nature of the topography, 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 cell, or series of cells of the same or similar optimum 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 cell or particular series of cells (for clarity and economy).

Comment [j42]: S-4 text not yet reviewed by CSPCWG.

Distinction: Slope top line.

5.3 River

IHO Definition: **RIVER**. A relatively large natural stream of water. (IHO Dictionary – S-32, Edition 5; 4405)

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	RIVERS (L, A)	STATUS (O) 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~~	L

Comment [j43]: S-57 Extension 06/01.

Status: IHO Definition:

5) **Periodic/intermittent**

IHO Definition: Recurring at intervals. (The Concise Oxford Dictionary, 7th Edition).

INT 1 Reference: C 20, 21

5.3.1 Rivers (see S-4 – B-353)

Inland navigable waters must be compiled as fully as practicable, consistent with the optimum 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).

Comment [j44]: S-4 text not yet reviewed by CSPCWG.

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

Geo feature: River (**RIVERS**)
Attributes: NOBJNM OBJNAM STATUS INFORM NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND SORDAT SORIND

Remarks:

- If the river is navigable at the optimum display scale for the ENC data, it must be encoded using the feature **DEPARE**, **DRGARE** (see clause X.X) or **UNSARE**, and the riverbanks must be encoded using the feature **COALNE** or **SLCONS**. The river must not be encoded as a **RIVERS** feature in this case. If it is required to encode the name of the river, it must be done using a **SEAARE** feature with attribute CATSEA = *53* (river).
- If it is required to encode a river that is not navigable at the optimum display scale for the ENC data, it must be done using **RIVERS**, covered by a **LNDARE** or **UNSARE** feature. The name of the river should be encoded using the attribute OBJNAM on the **RIVERS** feature.
- Intermittent rivers are those that are dry most of the time, and where required must be encoded **RIVERS** feature with attribute STATUS = *5* (periodic/intermittent).
- If it is required to encode an island in a non-navigable river, this should be done by encoding a "hole" in the **RIVERS** feature if the island is an area at the optimum display scale for the ENC data, or encoding **LNDARE** of type point if the island is a point at the optimum display scale for the ENC data. Encoders

Comment [j45]: S-4 text not yet reviewed by CSPCWG.

should not encode **LNDARE** areas on top of **LNDARE** areas.

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

5.4 Rapids

Comment [j46]: Is this required for S-101 ENC? Take into account that point RAPIDS do not symbolize in ECDIS.

IHO Definition: **RAPID(S)**. 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, Edition 5; 4228)

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**RAPIDS** (P, L, A)			

Comment [j47]: Should not be allowed for S-101 ENCs – does not display in ECDIS. Refer ENC EB 29.

INT 1 Reference: C 22

5.4.1 Rapids (see S-4 – B-353.5)

If it is required to encode rapids within a river, it must be done using the feature **RAPIDS**.

Geo feature: Rapids (**RAPIDS**)
Attributes: NOBJNM OBJNAM VERLEN INFORM NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND SORDAT SORIND

Remarks:
- The area covered by rapids must also be covered by a **RIVERS** feature (see clause 5.3), and a **LNDARE** or **UNSARE** feature.

Distinction: 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

IHO Definition: **WATERFALL**. 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).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**WATFAL** (P, L)	CONVIS (O) Conspicuous, visually	1: visually conspicuous ~~2: not visually conspicuous~~	E
		VERLEN (O) Vertical length	Unit: Defined in the HUNI subfield of the DSPM record or the HUNITS attribute of the M_UNIT meta feature: metre Resolution: 0·1m Format: xxx.x Example: **24.5** for a vertical length of 24.5 metres	F

Comment [j48]: As for rapids above.

Vertical length: IHO Definition: The total vertical length of an object.

Remarks:
- For floating features: The vertical distance from the surface of water to the highest point of that feature.
- For fixed objects 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.

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, Edition 5; 984).

INT 1 Reference: C 22

5.5.1 Waterfalls (see S-4 – B-353.5)

If it is required to encode a waterfall within a river, it must be done using the feature **WATFAL**.

Geo feature: Waterfall (**WATFAL**)
Attributes: CONVIS NOBJNM OBJNAM VERLEN INFORM NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND SORDAT SORIND

Remarks:
- The area covered by a waterfall must also be covered by a **RIVERS** feature, and a **LNDARE** or **UNSARE** feature.

Distinction: Rapids.

5.6 Lake

IHO Definition: **LAKE**. A large body of water entirely surrounded by land. (IHO Dictionary – S-32, Edition 5; 2629).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**LAKARE** (A)	OBJNAM (O) Object name		S

Object name: IHO Definition: The individual name of a feature.

INT 1 Reference: C 23

5.6.1 Lakes (see S-4 – B-353.6)

Inland navigable waters must be compiled as fully as practicable, consistent with the optimum 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).

Comment [j49]: S-4 text not yet reviewed by CSPCWG.

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

Geo feature: Lake (**LAKARE**)
Attributes: ELEVAT NOBJNM OBJNAM INFORM NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND SORDAT SORIND

Remarks:

- If the lake is navigable at the optimum display scale for the ENC data, it must be encoded using the feature **DEPARE** or **DRGARE** (see clause X.X), and the lake shore must be encoded using the feature **COALNE** or **SLCONS**. The lake must not be encoded as a **LAKARE** feature in this case. If it is required to encode the name of the lake, it must be done using a **SEAARE** feature, with attribute CATSEA = *52* (lake).
- If it is required to encode a lake that is not navigable at the optimum display scale for the ENC data, it must be done using **LAKARE**, covered by a **LNDARE** or **UNSARE** feature. The name of the lake should be encoded using the attribute OBJNAM on the **LAKARE** feature.
- If it is required to encode an island in a non-navigable lake, this should be done by encoding a "hole" in the **LAKARE** feature if the island is an area at the optimum display scale for the ENC data, or encoding **LNDARE** of type point if the island is a point at the optimum display scale for the ENC data. Encoders should not encode **LNDARE** areas on top of **LNDARE** areas.

Distinction: Canal; depth area; river.

5.7 Land region

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

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**LNDRGN** (P, A)	CATLND (m) Category of land region	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	L
		NATSUR (O) Nature of surface	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~~	L
		NATQUA (O) Nature of surface – qualifying terms	1 : fine 2 : medium 3 : coarse 4 : broken ~~5 : sticky~~ ~~6 : soft~~ ~~7 : stiff~~ 8 : volcanic 9 : calcareous ~~10 : hard~~	L

		WATLEV (O) Water level effect	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~~	E
		OBJNAM (m) Object name		S

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, Edition 5; 502).

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, Edition 5; 638).

8) **Paddy field**

IHO Definition: A piece of land set aside for crops which are periodically flooded (e.g. rice paddy).

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, Edition 5; 5240).

13) **Landslide**

IHO Definition: (or landslip). The sliding down of a mass of land on a mountain or cliff-side; land which has so fallen. (IHO Dictionary – S-32, Edition 5; 2646).

14) **Lava flow**

IHO Definition: The substance that results from the cooling of molten rock. (Adapted from IHO Dictionary – S-32, Edition 5; 2680).

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, Edition 5; 4494).

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, Edition 5; 1115). 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, Edition 5; 3852).

20) **Cay**

IHO Definition: A small insular feature usually with scant vegetation; usually of sand or coral. Often applied to smaller coral shoals. (UKHO – The Mariners Handbook).

Object name: IHO Definition: The individual name of an object.

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 chart scale, 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 sees 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

the larger scale charts. 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 slopping 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 transists 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.

Comment [j50]: S-4 text not yet reviewed by CSPCWG.

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

Geo feature: Land region (**LNDRGN**)

Attributes:						
	CATLND	NATQUA	NATSUR	NOBJNM	OBJNAM	WATLEV
	INFORM	NINFOM	NTXTDS	SCAMIN	TXTDSC	RECDAT
	RECIND	SORDAT	SORIND			

Remarks:

- This feature has a use similar to that of the feature **SEAARE** (see clause X.X), but for the land.
- At least one of CATLND or OBJNAM must be populated.
- A **LNDRGN** area should be bounded, if possible, by existing lines used by other features (e.g. **COALNE**). If necessary, however, this area may be bounded by other lines created to close the area, or to describe a new area.
- For named capes, points, peninsulas and other types of **LNDRGN** where there is no specific value for the attribute CATLND, the generic term “Cape”, “Point”, “Peninsula”, etc may be included on the attributes OBJNAM and NOBJNM.
- **LNDRGN** features of type area may overlap.
- A **LNDRGN** feature of type area must be covered by features from Group 1 (**LNDARE**, **DEPARE**, **UNSARE** etc).

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 **LNDRGN** feature, with attribute CATLND = *2* (marsh).

If the seaward edge of a marsh area is coincident with the coastline, the coastline should be encoded as a **COALNE** feature, with attribute CATCOA = *8* (marshy shore), and the coastline’s spatial feature should have the attribute QUAPOS = *4* (approximate) for the visible coastline.

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 **LNDRGN** feature, with attribute CATLND = *15* (salt pan) covered by a **LNDARE** 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 **COALNE** feature, with attribute CATCOA = *2* (flat coast).

Lava flow (see S-4 – B-355)

If it is required to encode a lava flow, it must be done using a **LNDRGN** feature, with attribute CATLND = *14* (lava flow).

Distinction: Sea area; land area; vegetation.

5.8 Vegetation

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

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**VEGATN** (P, L, A)	CATVEG (M) Category of vegetation	~~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	L
		CONVIS (O) Conspicuous, visually	1 : visually conspicuous, ~~2 : not visually conspicuous~~	E

Comment [j51]: Values 1, 10, 11, 12 should be deleted as they do not symbolize in ECDIS (ENC EB No. 29.

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 Seeschiffahrt und Hydrographie, Germany).

5) **Coniferous wood**

IHO Definition: A wood with evergreen trees of a group usually bearing cones, including yews, cedars and redwoods. (Bundesamt für Seeschiffahrt und Hydrographie, Germany).

6) **Wood in general (inc mixed wood)**

IHO Definition: Growing trees densely occupying a tract of land. (The Concise Oxford Dictionary).

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, Edition 5; 3064).

~~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 tine 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, Edition 5; 3064).

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).

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

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

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

a. Areas where trees or marsh form the apparent coastline; see S-4 – B-312;

b. Isolated trees or clumps of trees forming landmarks;

c. Where, near the coast, wooded areas alternate with areas without tree cover and so may assist in identifying headlands or other stretches of coastline.

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

- 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.

Comment [j52]: S-4 text not yet reviewed by CSPCWG

If it is required to encode vegetation, it must be done using the feature **VEGATN**.

Geo feature: Vegetation (**VEGATN**)
Attributes: CATVEG CONVIS ELEVAT
HEIGHT - approximate altitude of the highest point of the top of the vegetation
NOBJNM OBJNAM VERLEN INFORM NINFOM NTXTDS
SCAMIN TXTDSC RECDAT RECIND SORDAT SORIND

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

If it is required to encode a mangrove area, it must be done using a **VEGATN** feature, with CATVEG = *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 **COALNE** feature, with attribute CATCOA = *7* (mangrove), and the mangrove area's corresponding spatial feature should have the attribute QUAPOS = *4* (approximate). The landward edge of the mangrove area (which also bounds **LNDARE**) should be encoded using a **COALNE** feature having no value for CATCOA and no value for QUAPOS 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 **LNDARE**), the seaward edge of the encoded mangrove area should be encoded using a **COALNE** feature, with attribute CATCOA = *7* (mangrove), and the mangrove area's corresponding spatial feature should have the attribute QUAPOS = *4* (approximate).

Remarks:

- Where the source shows an island with the approximate height of the top of trees above height datum (see INT1 - C14), a **VEGATN** feature should be encoded co-incident with the **LNDARE** 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: **ICE AREA**. An area of ice over land or water. (S-57, Appendix A – Chapter 1, Edition 3.1, Page 1.84, November 2000).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**ICEARE** (A)	CATICE (M) Category of ice	1 : fast ice 5 : glacier 8 : polar ice	E
		CONVIS (O) Conspicuous, visually	1 : visually conspicuous, 2 : not visually conspicuous	E
		STATUS (O) 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~~	L

Comment [j53]: S-57 Extension 06/01.

Category of ice: IHO Definition:

1) **Fast Ice**

IHO Definition: 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, Edition 5; 1772).

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, Edition 5; 2041).

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, Edition 5; 3928).

INT 1 Reference: C 25; N 60.1-2

5.9.1 Ice areas (see S-4 – B-449.1)

If it is required to encode an ice area, it must be done using the feature **ICEARE**.

Geo feature:	Ice area (**ICEARE**)					
Attributes:	CATICE	CONVIS	ELEVAT	HEIGHT	NOBJNM	OBJNAM
	PEREND	PERSTA	STATUS	VERLEN	INFORM	NINFOM
	NTXTDS	SCAMIN	TXTDSC	RECDAT	RECIND	SORDAT
	SORIND					

Remarks:

- **ICEARE** features that are located in the sea must be covered by a **LNDARE** or **UNSARE** feature, if the depth of water beneath them is unknown, or covered by a **DEPARE** feature, if the depth is known.
- As ice fronts move, a date when the limit was surveyed should be included if possible, using the attribute SORDAT.

Glaciers (see S-4 – B-353.8)

If it is required to encode the portion of a glacier that is on land, it must be done using an **ICEARE** feature, with attribute CATICE = *5* (glacier) covered by a **LNDARE** feature (i.e. the glacier does not form a hole in the land area).

If the seaward edge of an encoded glacier is coincident with the coastline, this edge should be encoded using a **COALNE** feature, with attribute CATCOA = *6* (glacier (seaward end)).

Distinction: Depth area; land area.

5.10 Sloping ground

IHO Definition: **SLOPING GROUND**. An inclined surface. (Adapted from IHO Dictionary – S-32, Edition 5; 4776).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**SLOGRD** (P, A)	CATSLO (O) Category of slope	1 : cutting 2 : embankment 3 : dune 4 : hill 6 : cliff 7 : scree	E
		COLOUR (O) 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	L
		CONRAD (O) Conspicuous, radar	1 : radar conspicuous ~~2 : not radar conspicuous~~ ~~3 : radar conspicuous (has radar reflector)~~ ~~4 : radar conspicuous (has radar Target Enhancer)~~	E
		CONVIS (O) Conspicuous, visually	1 : visually conspicuous, ~~2 : not visually conspicuous~~	E
		NATSUR (O) Nature of surface	~~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~~	L

Comment [j54]: MD8 – 7.Co.22

Category of slope: IHO Definition:

1) **Cutting**

IHO Definition: An excavation through high ground for a road, canal, etc.

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, Edition 5; 1496).

4) **Hill**

IHO Definition: A small isolated elevation, smaller than a mountain. (IHO Dictionary – S-32, Edition 5; 2262).

6) **Cliff**

Comment [j55]: MD8 – 7.Co.22

IHO Definition: Land rising abruptly for a considerable distance above the water or surrounding land. (IHO Dictionary – S-32, Edition 5; 829).

7) **Scree**

IHO Definition: A mass of detritus, forming a precipitous, strong slope upon a mountain-side. Also the material composing such a slope. (IHO Dictionary – S-32, Edition 5; 4548).

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)

Geo feature: Sloping ground (**SLOGRD**)

Attributes:						
	CATSLO	COLOUR	CONRAD	CONVIS	NATSUR	NOBJNM
	OBJNAM	INFORM	NINFOM	NTXTDS	SCAMIN	TXTDSC
	RECDAT	RECIND	SORDAT	SORIND		

Remarks:

- **SLOGRD** of type area that are not radar conspicuous (i.e. CONRAD not equal to *1* (radar conspicuous)) and having attribute CATSLO = *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 **LNDMRK** or **VEGATN** should be used.

Comment [j56]: ENC Encoding Bulletin No. 29.

5.10.2 Dunes, sand hills

If it is required to encode a sand dune or sand hill, it must be done using the feature **SLOGRD** with attribute CATSLO = *3* (dune) or *4* (hill) and attribute NATSUR = *4* (sand). If these features are positioned along the coastline, a **COALNE** feature must also be encoded.

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

5.10.3 Cliffs

A coast backed by rock or earth cliffs gives a good radar return and is useful for visual identification from a considerable distance off, where cliffs alternate with low lying coast along the shoreline. Where cliffs are prominent features they should be encoded on the larger optimum display scale for the 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 distances off, (for clearing inshore dangers) and should be encoded where possible.

Comment [j57]: S-4 text not yet reviewed by CSPCWG

If it is required to encode a cliff, it must be done using a **SLOGRD** feature, with attribute CATSLO = 6 and/or using the feature **SLOTOP** (see clause 6.11). For example:

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

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

Remarks:

- When the cliff is coincident with the coastline, a **COALNE** feature, with attribute CATCOA = *1* (steep coast) should be encoded, and there should be no **SLOGRD** or **SLOTOP** encoded.

Cuttings and embankments

If it is required to encode cuttings and embankments, this must be done in the same way as cliffs; using **SLOGRD** and/or **SLOTOP** features, with attribute CATSLO = *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

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

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol*	**SLOTOP** (L)	CATSLO (O) Category of slope	1 : cutting 2 : embankment ~~3 : dune~~ ~~4 : hill~~ 6 : cliff ~~7 : scree~~	E
ECDIS Symbol		COLOUR (O) 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	L
		CONRAD (O) Conspicuous, radar	1 : radar conspicuous ~~2 : not radar conspicuous~~ ~~3 : radar conspicuous (has radar reflector)~~ ~~4 : radar conspicuous (has radar Target Enhancer)~~	E
		CONVIS (O) Conspicuous, visually	1 : visually conspicuous, ~~2 : not visually conspicuous~~	E
		NATSUR (O) Nature of surface	~~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~~	L

Category of slope: IHO Definition:

1) **Cutting**

IHO Definition: An excavation through high ground for a road, canal, etc.

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).

6) **Cliff**

IHO Definition: Land rising abruptly for a considerable distance above the water or surrounding land. (IHO Dictionary – S-32, Edition 5; 829).

INT 1 Reference: C 3; D 14, 15

5.11.1 Slope topline

Geo feature:	Slope topline (**SLOTOP**)					
Attributes:	CATSLO	COLOUR	CONRAD	CONVIS	ELEVAT	NATSUR
	NOBJNM	OBJNAM	INFORM	NINFOM	NTXTDS	SCAMIN
	TXTDSC	RECDAT	RECIND	SORDAT	SORIND	

5.11.2 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 optimum 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.

Comment [j58]: S-4 text not yet reviewed by CSPCWG

If it is required to encode a cliff, it must be done using a **SLOTOP** feature, with attribute CATSLO = *6* (cliff) and/or using the feature **SLOGRD** (see clause 6.10). For example:

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

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

Remarks:

- When the cliff is coincident with the coastline, a **COALNE** feature, with attribute CATCOA = *1* (steep coast) should be encoded, and there should be no **SLOTOP** or **SLOGRD** encoded.

5.11.3 Cutting 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 **SLOTOP** and/or **SLOGRD** features, with attribute CATSLO = *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: **PINGO**. 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, Edition 5; 3850).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**PINGOS** (P, A)	CONRAD (O) Conspicuous, radar	1 : radar conspicuous ~~2 : not radar conspicuous~~ ~~3 : radar conspicuous (has radar reflector)~~ ~~4 : radar conspicuous (has radar Target Enhancer)~~	E
		CONVIS (O) Conspicuous, visually	1 : visually conspicuous, ~~2 : not visually conspicuous~~	E
		EXPSOU (O) Exposition of sounding	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~~	E
		NATSUR (O) Nature of surface	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~~	L
		NATQUA (O) Nature of surface – qualifying terms	1 : fine 2 : medium 3 : coarse 4 : broken 5 : sticky 6 : soft 7 : stiff 8 : volcanic ~~9 : calcareous~~ ~~10 : hard~~	L
		QUASOU (O) Quality of sounding	1 : depth known 2 : depth unknown 3 : doubtful sounding 4 : unreliable sounding	L

		measurement	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~~	
		TECSOU (O) Technique of sounding measurement	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	L
		VERDAT (O) Vertical datum	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	E

			~~28 : Higher high water large tide~~ ~~29 : Nearly highest high water~~ ~~30 : Highest astronomical tide (HAT)~~	
		WATLEV (O) Water level effect	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~~	E

INT 1 Reference: NOT SPECIFIED

Pingo

If it is required to encode a pingo, either on land or intertidal/submerged, it must be done using the feature **PINGOS**.

Geo feature: Pingo (**PINGOS**)

Attributes:						
	CONRAD	CONVIS	EXPSOU	HEIGHT	NATQUA	NATSUR
	NOBJNM	OBJNAM	QUASOU	TECSOU	VALSOU	VERDAT
	VERLEN	WATLEV	INFORM	NINFOM	NTXTDS	SCAMIN
	TXTDSC	RECDAT	RECIND	SORDAT	SORIND	

Remarks:

Distinction: Depth area; land area.

5.13 Tideway

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

A channel through which a tidal current runs. (IHO Dictionary – S-32, Edition 5; 5502).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**TIDEWY** (L, A)			

INT 1 Reference: Not specified

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 **TIDEWY**.

Geo feature: Tideway (**TIDEWY**)
Attribute: NOBJNM OBJNAM INFORM NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND SORDAT SORIND

Remarks:
- **TIDEWY** features must be covered by **DEPARE**, **DRGARE** or **UNSARE** features.

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

6 Cultural Features

6.1 Built-up area

IHO Definition: **BUILT-UP AREA.** A tract containing a concentration of buildings and/or other structures. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**BUAARE** (P, A)	CATBUA (O) Category of built-up area	1 : urban area 2 : settlement 3 : village 4 : town 5 : city 6 : holiday village	E
		CONDTN (O) Condition	1 : under construction 2 : ruined 3 : under reclamation ~~4 : wingless~~ 5 : planned construction	E
		CONRAD (O) Conspicuous, radar	1 : radar conspicuous ~~2 : not radar conspicuous~~ ~~3 : radar conspicuous (has radar reflector~~	E
		CONVIS (O) Conspicuous, visually	1 : visually conspicuous ~~2 : not visually conspicuous~~	E

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).

INT 1 Reference: D 1-4

6.1.1 Built-up areas (see S-4 – B-370)

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

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

Geo feature: Built-up area (**BUAARE**)

Attributes:						
	CATBUA	CONDTN	CONRAD	CONVIS	HEIGHT	NOBJNM
	OBJNAM	INFORM	NINFOM	NTXTDS	PICREP	SCAMIN
	TXTDSC	RECDAT	RECIND	SORDAT	SORIND	

Remarks:

- A built-up area crossed by line features (e.g. roads, streets, railways) should not be divided into multiple features, unless separate sections of the built-up area have at least one different attribute value.
- However, for presentation purposes, a built up area of type area crossed by a river or canal of type area must be divided into several features, with the built-up area features not overlapping the river or canal feature. A built up area of type area should not overlap a lake, dock or lock basin feature of type area.
- Several buildings or built-up areas may be referred to by the same settlement, village or town name on the source. In such cases, the individual buildings or built-up areas should be encoded as separate unnamed features, using the features **BUISGL** or **BUAARE**, and additionally, an **ADMARE** feature (see clause XX.X) covering the whole named area should be created with the name encoded using the attribute OBJNAM. The encoded **ADMARE** feature should also have the attribute JRSDTN = *3* (national sub-division).
- **BUAARE** must be covered by **LNDARE** features of type area, or be coincident with **LNDARE** features of type point.

Comment [j59]: S-58 Check 56.

Distinction: Building single; landmark; railway; road; square.

6.2 Building, single

IHO Definition: **BUILDING, SINGLE**. 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).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**BUISGL** (P, A)	BUISHP (O) Building shape	5 : high-rise building 6 : pyramid 7 : cylindrical 8 : spherical 9 : cubic	E
		COLOUR (O) 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	L
		COLPAT (m) Colour pattern	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) ~~6 : border stripe~~	E
		CONDTN (O) Condition	1 : under construction 2 : ruined ~~3 : under reclamation~~ ~~4 : wingless~~ 5 : planned construction	E
		CONRAD (O) Conspicuous, radar	1 : radar conspicuous ~~2 : not radar conspicuous~~ 3 : radar conspicuous (has radar reflector)	E
		CONVIS (O) Conspicuous, visually	1: visually conspicuous ~~2: not visually conspicuous~~	E
		FUNCTN (O) Function	2 : harbor-master's office 3 : custom office 4 : health office 5 : hospital 6 : post office 7 : hotel	L

			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	
		NATCON (O) Nature of construction	1 : masonry 2 : concreted ~~3 : loose boulders~~ ~~4 : hard surfaced~~ ~~5 : unsurfaced~~ 6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted	L

Comment [j60]: S-57 Extension 06/01.

		STATUS (O) 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~~	L

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

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).

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, Edition 5; 2191).

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, Edition 5; 3845).

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, Edition 5; 2917).

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.

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).

33) **Lght support**

IHO Definition: A structure serving as a support for one or more lights. (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 [j62]: S-57 Extension 06/01.

Status: IHO Definition:

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).

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).

12) **Illuminated**

IHO Definition: Lit by floodlights, strip lights, etc.

13) **Historic**

IHO Definition: Famous in history; of historical interest. (The Concise Oxford Dictionary, 7th Edition).

14) **Public**

IHO Definition: Belonging to, available to, used or shared by, the community as a whole and not restricted to private use. (adapted from The New Shorter Oxford English Dictionary, 1993).

18) **Existence doubtful**

IHO Definition: A feature whose existence has been reported and was not able to be confirmed, but which is assumed to be present for reasons of safety. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

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-370.3,5; B-372; 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 optimum 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 optimum 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 optimum display scale for the ENC ENC data permits, the building outline should be shown 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 **BUISGL**.

Geo feature: Building, single (**BUISGL**)

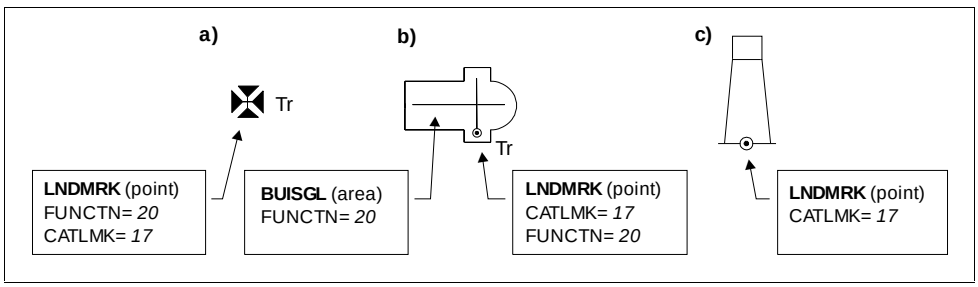
Attributes:						
	BUISHP	COLOUR	COLPAT	CONDTN	CONRAD	CONVIS
	ELEVAT	FUNCTN	HEIGHT	NATCON	NOBJNM	OBJNAM
	STATUS	VERLEN	INFORM	NINFOM	NTXTDS	PICREP
	SCAMIN	TXTDSC	RECDAT	RECIND	SORDAT	SORIND

Remarks:

- For landmarks, see clause 8.1; for silos and tanks, see clause 8.2.
- A ruined building should be encoded in the same way as the feature in good condition, but with attribute CONDTN = *2* (ruined).
- Occasionally, it may be required to encode a building that is located in, or partially overlaps, the navigable water area (e.g. boathouses, service facilities, scenic or floating restaurants). Where it is required to encode such features, they must be encoded as follows:
  - Land and water areas must be encoded as they exist in the real world using the appropriate Group 1 Objects (**LNDARE** and **DEPARE**), including under the area of the building (NOTE: If the building is floating, the Group 1 Object encoded must be **PONTON**).
  - Any other associated features must be encoded as they exist in the real world; e.g. jetties as **SLCONS** (with attribute WATLEV = *2* (always dry)), mooring posts as **MORFAC**. The building itself should be encoded as **BUISGL** ((area or point) on the **PONTON** or **SLCONS**. If required, the attribute INFORM may be populated with the appropriate descriptive text (e.g. *Boathouse*).
  - If the service being provided by the structure is known, Object Classes **SMCFAC** or **HRBFAC** may also be used.

Comment [j63]: ENC FAQ No. 11

- When a building is shown as an area, indicating its true shape, and it is required to encode a prom feature such as a tower or spire that is part of the structure, two features must be created (see Figure below):
  - a **BUISGL** feature of type area for the main building,
  - a **LNDMRK** feature of type point for the prominent feature.



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

6.3 Airport/airfield

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

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**AIRARE** (P, A)	CATAIR (O) Category of airport/airfield	1 : military aeroplane airport 2 : civil aeroplane airport 3 : military heliport 4 : civil heliport 5 : glider airfield 6 : small planes airfield 8 : emergency airfield	E
		CONDTN (O) Condition	1 : under construction 2 : ruined ~~3 : under reclamation~~ ~~4 : wingless~~ 5 : planned construction	E
		STATUS (O) 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~~	L

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

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.

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.

6) **Small planes airfield**

IHO Definition: An area of land set aside for the take-off and landing of small aeroplanes.

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.

INT 1 Reference: D 17

6.3.1 Airfields (see S-4 – B-366)

Airfields (or airports) within a few miles of the coast must be charted on larger and medium optimum 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.

For ENC data having larger optimum display scales, an airport should be encoded using a combination of the following features: **AIRARE** (area), **RUNWAY** (area or line), **BUISGL** (area or point) and **LNDMRK** (area or point). At least one **AIRARE** or **RUNWAY** 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 **C_ASSO** (see clause X.X).

For ENC data having smaller optimum display scales, an airport should be encoded as an **AIRARE** of type point.

Geo feature: Airport / airfield (**AIRARE**)

Attributes:	CATAIR	CONDTN	NOBJNM	OBJNAM	STATUS	INFORM
	NINFOM	NTXTDS	PICREP	SCAMIN	TXTDSC	RECDAT
	RECIND	SORDAT	SORIND			

Remarks:

- If individual buildings are visually conspicuous, they must be encoded as separate features.
- If it is required to encode the control tower, it must be done using a **LNDMRK** feature, with attributes FUNCTN = *39* (control) and CATLMK = *17* (tower). If it is required to encode other buildings, this must be done using the feature **BUISGL**.
- If it is required to encode a seaplane landing area, it must be done using the feature **SPLARE** (see clause X.X).

Distinction: Runway; seaplane landing area.

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, Edition 5; 4465).

A site on which helicopters may land and take off. (IHO Dictionary – S-32, Edition 5; 2232).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**RUNWAY** (P, L, A)	CATRUN (O) ~~Category of~~ runway	1 : aeroplane runway 2 : helicopter landing pad	L
		CONDTN (O) Condition	1 : under construction 2 : ruined ~~3 : under reclamation~~ ~~4 : wingless~~ 5 : planned construction	E
		NATCON (O) Nature of construction	~~1 : masonry~~ 2 : concreted ~~3 : loose boulders~~ 4 : hard surfaced 5 : unsurfaced ~~6 : wooden~~ ~~7 : metal~~ ~~8 : glass reinforced plastic (GRP)~~ ~~9 : painted~~	L
		STATUS (O) 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~~	L

Comment [j65]: Should not be allowed for S-101 ENCs – does not display in ECDIS. Refer ENC EB 29.

Comment [j66]: S-57 Extension 06/01.

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, Edition 5; 4465).

2) **Helicopter landing pad**

   IHO Definition: A site on which helicopters may land and take off. (IHO Dictionary – S-32, Edition 5;

2232).

Nature of construction: IHO Definition:

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).

4) **Hard surfaced**

IHO Definition: Constructed with a surface of hard material, usually a term applied to roads surfaced with asphalt or concrete.

5) **Unsurfaced**

IHO Definition: Constructed with no extra protection, usually a term applied to roads not surfaced with a hard material.

INT 1 Reference: D 17

6.4.1 Airfields (see S-4 – B-366)

For ENC data having larger optimum display scales, an airport should be encoded using a combination of the following features: **AIRARE** (area), **RUNWAY** (area or line), **BUISGL** (area or point) and **LNDMRK** (area or point). At least one **AIRARE** or **RUNWAY** 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 **C_ASSO** (see clause X.X).

Geo feature: Runway (**RUNWAY**)

Attributes:	CATRUN	CONDTN	NATCON	NOBJNM	OBJNAM	PEREND
	PERSTA	STATUS	INFORM	NINFOM	NTXTDS	SCAMIN
	TXTDSC	RECDAT	RECIND	SORDAT	SORIND	

Remarks:

- Two or more crossing runways may be encoded as one area.
- If it is required to encode a seaplane landing area, it must be done using the feature **SPLARE** (see clause X.X).

Distinction: Airport/airfield; seaplane landing area.

6.5 Bridge

IHO Definition: **BRIDGE**. A structure erected over a depression or an obstacle such as a body of water, railroad, etc., to provide a roadway for vehicles or pedestrians. (IHO Dictionary – S-32, Edition 5; 544).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World  Fixed Bridge *Photograph, courtesy of the Pacific Hydrographic Branch*  Fixed Bridge *Photograph, courtesy of the Pacific Hydrographic Branch* *Paper Chart Symbol* *ECDIS Symbol*	**BRIDGE** (P, L, A)	CATBRG (m) Category of bridge	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	E
		COLOUR (O) 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	L
		COLPAT (m) Colour pattern	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	L
		CONDTN (O) Condition	1 : under construction 2 : ruined ~~3 : under reclamation~~ ~~4 : wingless~~ 5 : planned construction	E
		CONRAD (O) Conspicuous, radar	1 : radar conspicuous ~~2 : not radar conspicuous~~ 3 : radar conspicuous (has radar reflector)	E
		CONVIS (O) Conspicuous, visually	1 : visually conspicuous ~~2 : not visually conspicuous~~	E

Comment [j67]: Should not be allowed for S-101 ENCs – does not display in ECDIS. Refer ENC EB 29.

		NATCON (O) Nature of construction	1 : masonry 2 : concreted ~~3 : loose boulders~~ ~~4 : hard surfaced~~ ~~5 : unsurfaced~~ 6 : wooden 7 : metal ~~8 : glass reinforced plastic (GRP)~~ 9 : painted	L
		HORCLR (O) Horizontal clearance	Unit: Defined in the HUNI subfield of the DSPM record or the HUNITS attribute of the M_UNIT meta feature: metre Resolution: 0·1m Format: xxx.x Example: **125** for a width of 125 metres	F
		VERCCL (m) Vertical clearance, closed	Unit: Defined in the HUNI subfield of the DSPM record or the HUNITS attribute of the M_UNIT meta feature: metre Resolution: 0·1m Format: xx.x Example: **11.2** for a vertical clearance of 11·2 metres	F
		VERCLR (m) Vertical clearance	Unit: Defined in the HUNI subfield of the DSPM record or the HUNITS attribute of the M_UNIT meta feature: .metre Resolution: 0·1m Format: xx.x Example: **7.6** for a vertical clearance of 7·6 metres	F
		VERCOP (m) Vertical clearance, open	Unit: Defined in the HUNI subfield of the DSPM record or the HUNITS attribute of the M_UNIT meta feature: metre Resolution: 0·1m Format: xx.x Example: **17.8** for a vertical clearance of 17·8 metres	F
		VERDAT (O) Vertical datum	~~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~~	E

			~~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)	

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, 7th 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, Edition 5; 547).

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, Edition 5; 545).

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, Edition 5; 546).

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, 7th 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).

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.

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.

Vertical clearance: IHO Definition: The vertical clearance measured from the horizontal plane towards the object overhead.

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.

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**.

Geo feature: Bridge (**BRIDGE**)

Attributes:
CATBRG - mandatory over navigable waters
COLOUR COLPAT CONDTN CONRAD CONVIS DATEND
DATSTA
HORACC - applies only to HORCLR
HORCLR NATCON NOBJNM OBJNAM
VERACC - applies only to VERCCL, VERCLR, VERCOP
VERCCL - mandatory for opening bridges over navigable waters
VERCLR - mandatory for non-opening (fixed) bridges over navigable waters
VERCOP - mandatory for opening bridges with limited clearance over navigable waters
VERDAT - applies only to VERCCL, VERCLR, VERCOP
INFORM NINFOM NTXTDS PICREP SCAMIN TXTDSC

RECDAT RECIND SORDAT SORIND

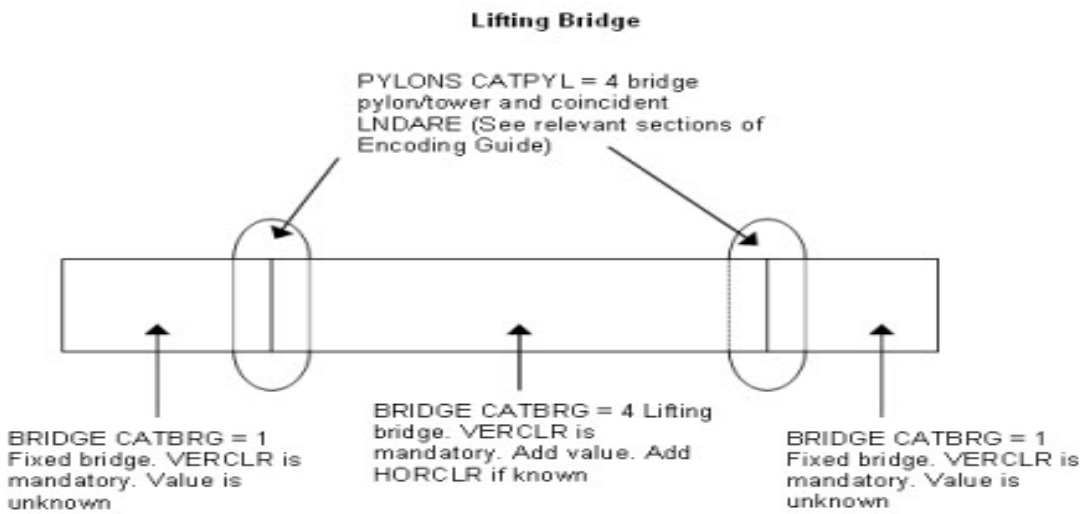
The value of the vertical clearance between (high) water level and any fixed overhead obstruction must always to be given, where known, on the largest optimum display scale ENC data intended for navigation under the obstruction, and for detailed passage planning. The datum above which clearances are given must be a high water level, preferably Highest Astronomical Tide (HAT), where the tide is appreciable. It must be populated for the attribute(s) VERCCL, VERCLR, VERCOP and VERCSA 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).

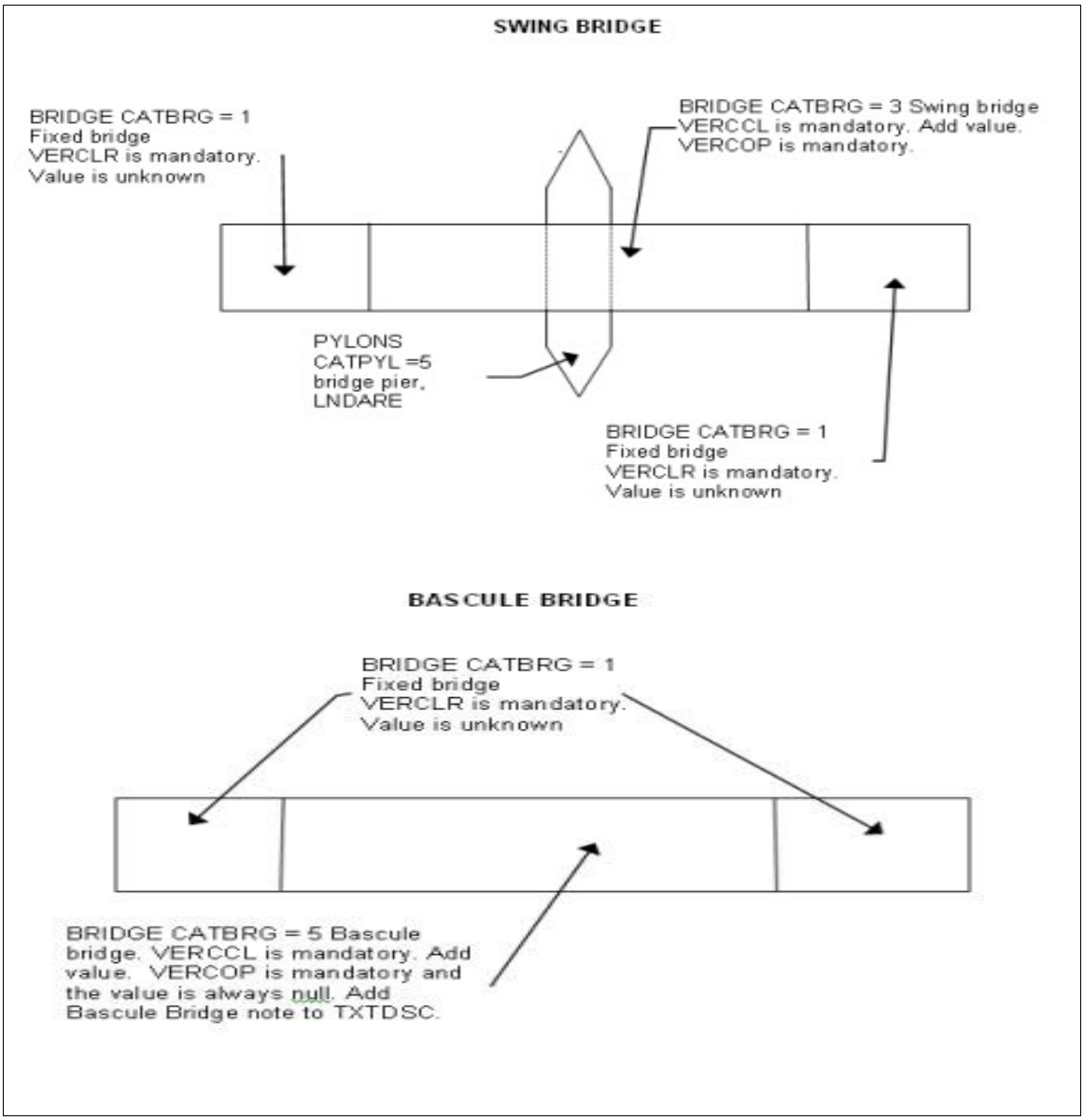
Remarks:

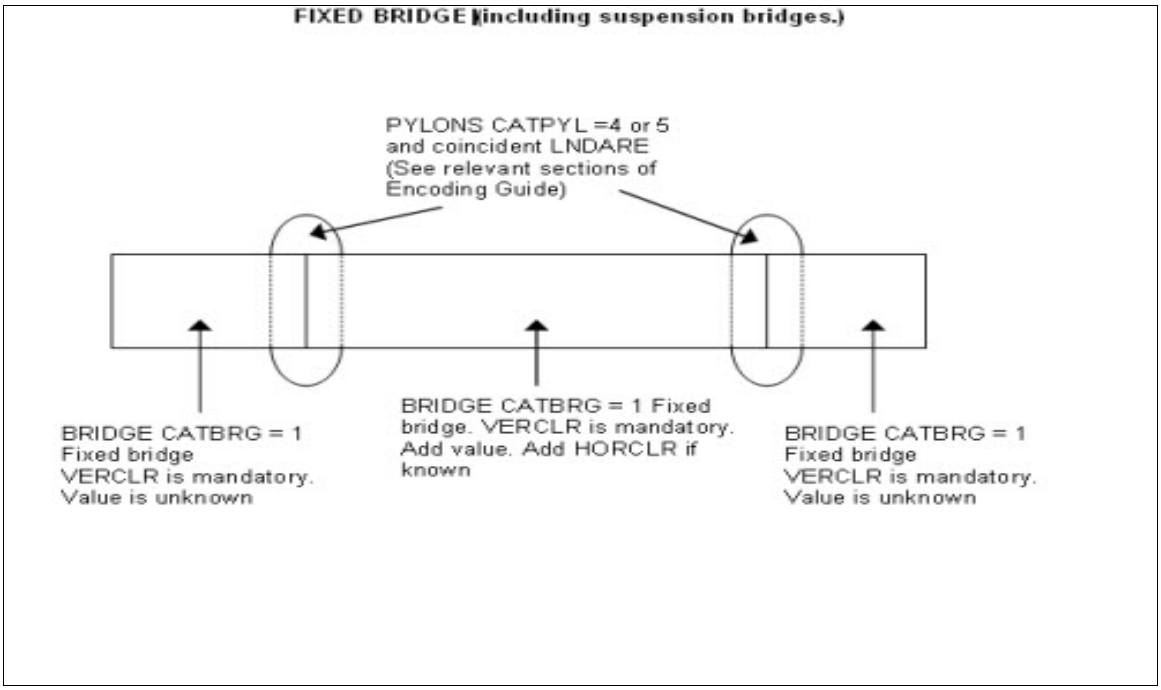
- Water under a bridge must be encoded using the feature **DEPCNT** and the features **DEPARE**, **DRGARE** or **UNSARE** if the waterway is navigable at the optimum display scale for the ENC data, or using the features **LNDARE** or **UNSARE** if the waterway is not navigable at the optimum display scale for the ENC data.
- When there is a vertical clearance, vertical clearance closed, or a vertical clearance open given for a bridge, it should be applied only to the portion of the bridge to which it refers. Bridges should be divided into the correct portions as indicated on the source. Each part should be encoded with the correct category of bridge and the correct clearances, as required by the category of bridge. See examples in the Figures below.
- In navigable water, bridge supports must be encoded, where possible, using a **PYLONS** feature (see clause X.X), with attribute CATPYL = *4* or *5*.
- It is not mandatory to encode roads or railways on bridges.

Distinction: Pipeline, overhead; pylon/bridge support.

6.5.2 Examples of Encoding Common Bridge Types




SWING BRIDGE
BRIDGE CATBRG = 1
Fixed bridge
VERCLR is mandatory.
Value is unknown
BRIDGE CATBRG = 3 Swing bridge
VERCCL is mandatory. Add value.
VERCOP is mandatory.
PYLONS
CATPYL =5
bridge pier,
LNDARE
BRIDGE CATBRG = 1
Fixed bridge
VERCLR is mandatory.
Value is unknown
BASCULE BRIDGE
BRIDGE CATBRG = 1
Fixed bridge
VERCLR is mandatory.
Value is unknown
BRIDGE CATBRG = 5 Bascule
bridge. VERCCL is mandatory. Add
value. VERCOP is mandatory and
the value is always null. Add
Bascule Bridge note to TXTDSC.


FIXED BRIDGE (including suspension bridges.)
PYLONS CATPYL =4 or 5
and coincident LNDARE
(See relevant sections of
Encoding Guide)
BRIDGE CATBRG = 1
Fixed bridge
VERCLR is mandatory.
Value is unknown
BRIDGE CATBRG = 1 Fixed
bridge. VERCLR is mandatory.
Add value. Add HORCLR if
known
BRIDGE CATBRG = 1
Fixed bridge
VERCLR is mandatory.
Value is unknown

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).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**CONVYR** (L, A)	CATCON (O) Category of conveyor	1 : aerial cableway (telepheric) 2 : belt conveyor 3 : flume	E
		COLOUR (O) 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	L
		COLPAT (m) Colour pattern	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	L
		CONDTN (O) Condition	1 : under construction 2 : ruined ~~3 : under reclamation~~ ~~4 : wingless~~ 5 : planned construction	E
		CONRAD (O) Conspicuous, radar	1 : radar conspicuous ~~2 : not radar conspicuous~~ 3 : radar conspicuous (has radar reflector)	E
		CONVIS (O) Conspicuous, visually	1 : visually conspicuous ~~2 : not visually conspicuous~~	E
		PRODCT (O) Product	~~1 : oil~~ ~~2 : gas~~ 3 : water ~~4 : stone~~ 5 : coal 6 : ore ~~7 : chemicals~~	E

Comment [j68]: S-57 Extension 06/01.

			~~8 : drinking water~~ ~~9 : milk~~ 10 : bauxite 11 : coke ~~12 : iron ingots~~ 13 : salt 14 : sand 15 : timber 16 : sawdust/wood chips 17 : scrap metal ~~18 : liquefied natural gas (LNG)~~ ~~19 : liquefied petroleum gas (LPG)~~ ~~20 : wine~~ ~~21 : cement~~ 22 : grain	
		STATUS (O) 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~~	L
		VERCLR (m) Vertical clearance	Unit: Defined in the HUNI subfield of the DSPM record or the HUNITS attribute of the M_UNIT meta feature: metre Resolution: 0·1m Format: xx.x Example: **7.6** for a vertical clearance of 7·6 metres	F
		VERDAT (O) Vertical datum	~~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~~	E

Comment [j69]: S-57 Extension 06/01.

			~~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)	

Category of conveyor: 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.

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.

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 Editi

Comment [j70]: S-57 Extension 06/01.

Product: IHO Definition:

3) **Water**

   IHO Definition: A colourless, odourless, tasteless liquid that is a compound of hydrogen and oxygen. (Adapted from the Oxford Minidictionary, Third Edition).

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 form 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).

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).

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).

Vertical clearance: IHO Definition: The vertical clearance measured from the horizontal plane towards the object overhead.

INT 1 Reference: D 25

6.6.1 Conveyors (see S-4 – B-382.3)

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

Geo feature: Conveyor (**CONVYR**)

Attributes:

CATCON	COLOUR	COLPAT	CONDTN	CONRAD	CONVIS
DATEND	DATSTA	HEIGHT	LIFCAP	NOBJNM	OBJNAM
PRODCT	STATUS				
VERACC -	applies only to VERCLR (not HEIGHT)				
VERCLR -	mandatory over navigable waters				
VERDAT -	applies only to VERCLR (not HEIGHT)				
VERLEN	INFORM	NINFOM	NTXTDS	PICREP	SCAMIN
TXTDSC	RECDAT	RECIND	SORDAT	SORIND	

The value of the vertical clearance between (high) water level and any fixed overhead obstruction must always to 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 for the attribute(s) VERCCL, VERCLR, VERCOP and VERCSA 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:

- In navigable water, conveyor supports must be encoded, where possible, using a **PYLONS** feature (see clause X.X), with attribute CATPYL = *3*.

Distinction: Cable, overhead; pylon/bridge support.

6.7 Cable, overhead

IHO Definition: **CABLE, OVERHEAD**. An overhead cable is 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).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World	**CBLOHD** (L)	CATCBL (O) Category of cable	1 : power line 3 : transmission line 4 : telephone 5 : telegraph 6 : mooring cable/chain	E
Paper Chart Symbol		CONDTN (O) Condition	1 : under construction ~~2 : ruined~~ ~~3 : under reclamation~~ ~~4 : wingless~~ 5 : planned construction	E
ECDIS Symbol		CONRAD (O) Conspicuous, radar	1 : radar conspicuous ~~2 : not radar conspicuous~~ 3 : radar conspicuous (has radar reflector)	E
		CONVIS (O) Conspicuous, visually	1 : visually conspicuous ~~2 : not visually conspicuous~~	E
		ICEFAC (O) Ice factor	Unit: Defined in the HUNI subfield of the DSPM record or the HUNITS attribute of the M_UNIT meta feature: metre Resolution: 0·1m Format: xx.x Example: **2.5** for a reduction of 2·5 metres in the vertical clearance.	F
		STATUS (O) 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~~	L

			~~17 : un-watched~~ ~~18 : existence doubtful~~ ~~19 : buoyed~~	
		VERCLR (m) Vertical clearance	Unit: Defined in the HUNI subfield of the DSPM record or the HUNITS attribute of the M_UNIT meta feature: metre Resolution: 0·1m Format: xx.x Example: **7.6** for a vertical clearance of 7·6 metres	F
		VERCSA (m) Vertical clearance, safe	Unit: Defined in the HUNI subfield of the DSPM record or the HUNITS attribute of the M_UNIT meta feature: metre Resolution: 0·1m Format: xx.x Example: **7.2** for a vertical clearance of 7·2 metres	F

Comment [j71]: S-57 Extension 06/01.

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.

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.

Ice factor: IHO Definition: The value of the maximum variation in the vertical clearance of an overhead cable due to an accumulation of ice.

Vertical clearance: IHO Definition: The vertical clearance measured from the horizontal plane towards the object overhead.

Vertical clearance, safe: IHO Definition: The safe vertical clearance measured from the horizontal plane towards the object overhead.

INT 1 Reference: D 26, 27

6.7.1 Overhead cables (see S-4 – B-382)

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

Geo feature:	Cable, overhead (**CBLOHD**)					
Attributes:	CATCBL	CONDTN	CONRAD	CONVIS	DATEND	DATSTA
	ICEFAC	NOBJNM	OBJNAM	STATUS		
	VERACC -	applies only to VERCLR and VERCSA				
	VERCLR	VERCSA				
	VERDAT -	applies only to VERCLR and VERCSA				
	INFORM	NINFOM	NTXTDS	SCAMIN	TXTDSC	RECDAT
	RECIND	SORDAT	SORIND			

The value of the vertical clearance between (high) water level and any fixed overhead obstruction must always to 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 for the attribute(s) VERCCL, VERCLR, VERCOP and VERCSA 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 attribute VERCSA.

Remarks:

- If it is required to encode telepheric cables, this must be done using **CONVYR** features (see clause 7.6), with attribute CATCON = *1* (aerial cableway (telepheric)).
- Where a cable has radar reflectors, they must be encoded as separate **RADRFL** features (see clause X.X). If the whole cable is radar conspicuous, or the compilation scale is too small to show individual reflectors, the **CBLOHD** should be encoded with attribute CONRAD = *1* (radar conspicuous).
- In navigable water, overhead cable supports must be encoded, where possible, using a **PYLONS** feature (see clause X.X), with attribute CATPYL = *1* or *2*.

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, Edition 5; 3857).

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

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World  Overhead Pipeline *Photograph, courtesy of the Pacific Hydrographic Branch* *Paper Chart Symbol* *ECDIS Symbol*	**PIPOHD** (L)	CATPIP (O) Category of pipeline/pipe	2 : outfall pipe 3 : intake pipe 4 : sewer ~~5 : bubbler system~~ 6 : supply pipe	E
		CONDTN (O) Condition	1 : under construction ~~2 : ruined~~ ~~3 : under reclamation~~ ~~4 : wingless~~ 5 : planned construction	E
		CONRAD (O) Conspicuous, radar	1 : radar conspicuous ~~2 : not radar conspicuous~~ 3 : radar conspicuous (has radar reflector)	E
		CONVIS (O) Conspicuous, visually	1 : visually conspicuous ~~2 : not visually conspicuous~~	E
		PRODCT (O) 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~~ ~~16 : sawdust/wood chips~~ ~~17 : scrap metal~~ 18 : liquefied natural gas (LNG) 19 : liquefied petroleum gas (LPG) ~~20 : wine~~ ~~21 : cement~~ ~~22 : grain~~	E

		STATUS (O) 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~~	L
		VERCLR (m) Vertical clearance	Unit: Defined in the HUNI subfield of the DSPM record or the HUNITS attribute of the M_UNIT meta feature: metre Resolution: 0·1m Format: xx.x Example: **7.6** for a vertical clearance of 7·6 metres	F

Comment [j72]: S-57 Extension 06/01.

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, Edition 5; 2468).

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).

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).

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).

7) **Drinking water**

IHO Definition: Water that is suitable for human consumption. (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 Websters New World Dictionary).

Vertical clearance: IHO Definition: The vertical clearance measured from the horizontal plane towards the object overhead.

INT 1 Reference: D 28

6.8.1 Overhead pipelines (see S-4 – B-383)

If it is required to encode an overhead pipeline passing over or nearby navigable waters, it must be done using the feature **PIPOHD**.

Geo feature: Pipeline overhead (**PIPOHD**)

Attributes:

CATPIP	CONDTN	CONRAD	CONVIS	DATEND	DATSTA
NOBJNM	OBJNAM	PRODCT	STATUS		
VERACC -	applies only to VERCLR				
VERCLR					
VERDAT -	applies only to VERCLR				
INFORM	NINFOM	NTXTDS	SCAMIN	TXTDSC	RECDAT
RECIND	SORDAT	SORIND			

The value of the vertical clearance between (high) water level and any fixed overhead obstruction must always to 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 for the attribute(s) VERCCL, VERCLR, VERCOP and VERCSA 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:

- Where an overhead pipeline is disused, it should be encoded with the attribute STATUS = *4* (not in use), and the attributes CATPIP and PRODCT must not be encoded.

Distinction: Pipeline area; pipeline, submarine/on land.

6.9 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, Appendix A – Chapter 1, Edition 3.1, Page 1.125, November 2000).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**PYLONS** (P, A)	CATPYL (M)	1 : power transmission pylon/pole 2 : telephone/telegraph pylon/pole 3 : aerial cableway/sky pylon 4 : bridge pylon/tower 5 : bridge pier	E
		COLOUR (O) 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	L
		COLPAT (m) Colour pattern	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	L
		CONDTN (O) Condition	1 : under construction 2 : ruined ~~3 : under reclamation~~ ~~4 : wingless~~ 5 : planned construction	E
		CONRAD (O) Conspicuous, radar	1 : radar conspicuous ~~2 : not radar conspicuous~~ 3 : radar conspicuous (has radar reflector)	E
		CONVIS (O) Conspicuous, visually	1 : visually conspicuous ~~2 : not visually conspicuous~~	E

		NATCON (O) Nature of construction	1 : masonry 2 : concreted ~~3 : loose boulders~~ ~~4 : hard surfaced~~ ~~5 : unsurfaced~~ 6 : wooden 7 : metal ~~8 : glass reinforced plastic (GRP)~~ 9 : painted	L
		WATLEV (O) Water level effect	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~~	E

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).

Natcon: 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).

6) **Wooden**

IHO Definition: Constructed from wood.

7) **Metal**

IHO Definition: Constructed from metal.

9) **Painted**

IHO Definition: The application of paint to some other construction or natural feature.

INT 1 Reference: D 26

6.9.1 Pylons and bridge supports (see S-4 – B-381 and B-382)

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

Comment [j73]: S-4 text relating to pylons currently under review by CSPCWG.

If it is required to encode a pylon or bridge support, it must be done using the feature **PYLONS**.

Geo feature: Pylon / bridge support (**PYLONS**)

Attributes:						
	CATPYL	COLOUR	COLPAT	CONDTN	CONRAD	CONVIS
	DATEND	DATSTA	HEIGHT	NATCON	NOBJNM	OBJNAM
	VERLEN	WATLEV	INFORM	NINFOM	NTXTDS	PICREP
	SCAMIN	TXTDSC	RECDAT	RECIND	SORDAT	SORIND

Remarks:

- A PYLONS feature of type area with attribute WATLEV = *1*, *2* or *6* must be covered by a **LNDARE** feature of type area (see clause X.X).

Distinction: Landmark.

6.10 Fence/wall

IHO Definition: **FENCE/WALL**. A natural or man-made barrier used as an enclosure or boundary or for protection. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**FNCLNE** (L)	CATFNC (O) Category of fence	1 : fence 3 : hedge 4 : wall	L
		COLOUR (O) 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	L
		COLPAT (m) Colour pattern	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	L
		CONDTN (O) Condition	1 : under construction 2 : ruined ~~3 : under reclamation~~ ~~4 : wingless~~ 5 : planned construction	E
		CONRAD (O) Conspicuous, radar	1 : radar conspicuous ~~2 : not radar conspicuous~~ ~~3 : radar conspicuous (has radar reflector)~~	E
		CONVIS (O) Conspicuous, visually	1 : visually conspicuous ~~2 : not visually conspicuous~~	E

		HEIGHT (O) Height	Unit: Defined in the HUNI subfield of the DSPM record or the HUNITS attribute of the M_UNIT meta feature: metre Resolution: 0·1m Format: xxx.x Example: **73** for a height of 73 metres	F
		NATCON (O) Nature of construction	1 : masonry 2 : concreted 3 : loose boulders ~~4 : hard surfaced~~ ~~5 : unsurfaced~~ 6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted	L
		STATUS (O) 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~~	L

Comment [j74]: S-57 Extension 06/01.

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).

Height: IHO Definition: The value of the vertical distance to the highest point of the object, measured from a specified vertical datum.

INT 1 Reference:

6.10.1 Fences and walls

If it is required to encode a fence or wall, it must be done using the feature **FNCLNE**.

Geo feature:	Fence/wall (**FNCLNE**)					
Attributes:	CATFNC	COLOUR	COLPAT	CONDTN	CONRAD	CONVIS
	ELEVAT	HEIGHT	NATCON	NOBJNM	OBJNAM	STATUS
	VERLEN	INFORM	NINFOM	NTXTDS	SCAMIN	TXTDSC
	RECDAT	RECIND	SORDAT	SORIND		

Remarks:

Distinction:

6.11 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).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World	**RAILWY** (L)	CONDTN (O) Condition	1 : under construction 2 : ruined ~~3 : under reclamation~~ ~~4 : wingless~~ 5 : planned construction	E
Paper Chart Symbol *ECDIS Symbol*		STATUS (O) 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~~	L

Comment [j75]: S-57 Extension 06/01.

INT 1 Reference: D 13

6.11.1 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 ENCss 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 optimum 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 - post, gantries etc.

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

Geo feature: Railway (**RAILWY**)
Attributes: CONDTN HEIGHT NOBJNM OBJNAM STATUS INFORM NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND SORDAT SORIND

Remarks:

- If it is required to encode a railway station, it must be done using a **BUISGL** feature, with attribute FUNCTN = *8* (railway station). On the largest optimum display scale ENC data, the names of railway terminals or main stations may be populated using the attribute OBJNAM for the **BUISGL**.
- Abandoned railways (those which are mostly still intact) should be encoded. If required, they should be encoded with the attribute STATUS = *4* (not in use).

Distinction: Road; tunnel.

6.12 Road

IHO Definition: **ROAD**. ~~A road is~~ an open way for the passage of vehicles. (United States Geological Survey, Jan. 89).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**ROADWY** (P, L, A)	CATROD (O) Category of road	1 : motorway 2 : major road 3 : minor road 4 : track/path 5 : major street 6 : minor street ~~7 : crossing~~	E
		CONDTN (O) Condition	1 : under construction 2 : ruined ~~3 : under reclamation~~ ~~4 : wingless~~ 5 : planned construction	E
		NATCON (O) Nature of construction	1 : masonry 2 : concreted ~~3 : loose boulders~~ 4 : hard surfaced 5 : unsurfaced ~~6 : wooden~~ ~~7 : metal~~ ~~8 : glass reinforced plastic (GRP)~~ ~~9 : painted~~	L
		OBJNAM (O) Nature of construction		S
		STATUS (O) 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~~	L

Category of road: IHO Definition:

Comment [j76]: Should not be allowed for S-101 ENCs – does not display in ECDIS. Refer ENC EB 29.

Comment [j77]: S-57 Extension 06/01.

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.

3) **Minor road**

IHO Definition: A secondary road for local traffic.

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.

6) **Minor street**

IHO Definition: A secondary road, in an urban area, for local traffic.

INT 1 Reference: D 7, 10-12

6.12.1 Roads and tracks (see S-4 – B-365)

On the largest optimum display scale continuous coastal series of ENCs, and larger optimum display scale ENC data, all roads and tracks running down to the coastline should be encoded where 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.

On smaller optimum display scale ENC data, roads must be omitted

If it is required to encode a road or track, it must be done using the feature **ROADWY**.

Geo feature:	Road (**ROADWY)**					
Attributes:	CATROD	CONDTN	NATCON	NOBJNM	OBJNAM	STATUS
	INFORM	NINFOM	NTXTDS	SCAMIN	TXTDSC	RECDAT
	RECIND	SORDAT	SORIND			

Remarks:

- ~~Road crossings (attribute CATROD = 7) should not be encoded.~~

Distinction: Causeway; railway; square.

6.13 Tunnel

IHO Definition: **TUNNEL**. A passage that is open to the atmosphere at both ends, buried under the sea bed or laid over the sea floor or bored under the ground or through mountains. (S-57, Appendix A – Chapter 1, Edition 3.1, Page 1.191, November 2000).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World	**TUNNEL** (P, L, A)	CONDTN (O) Condition	1 : under construction ~~2 : ruined~~ ~~3 : under reclamation~~ ~~4 : wingless~~ 5 : planned construction	E
Paper Chart Symbol *ECDIS Symbol*		HORCLR (O) Horizontal clearance	Unit: Defined in the HUNI subfield of the DSPM record or the HUNITS attribute of the M_UNIT meta feature: metre Resolution: 0·1m. Format: xxx.x Example: **125** for a width of 125 metres	F
		STATUS (O) 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~~	L
		VERCLR (O) Vertical clearance	Unit: Defined in the HUNI subfield of the DSPM record or the HUNITS attribute of the M_UNIT meta feature: metre Resolution: 0·1m Format: xx.x Example: **7.6** for a vertical clearance of 7·6 metres	F

INT 1 Reference: D 16

6.13.1 Tunnels (see S-4 – B-363.1)

Comment [j78]: Should not be allowed for S-101 ENCs – does not display in ECDIS. Refer ENC EB 29.

Comment [j79]: S-57 Extension 06/01.

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

Geo feature: Tunnel (**TUNNEL**)
Attribute: CONDTN
HORACC - applies only to HORCLR
HORCLR NOBJNM OBJNAM
VERACC - applies only to VERCLR
STATUS VERCLR INFORM NINFOM NTXTDS PICREP
SCAMIN TXTDSC RECDAT RECIND SORDAT SORIND

Remarks:

- If there is a waterway inside the tunnel, and the waterway is navigable at the optimum display scale for the ENC data, it must be encoded as if it were a navigable canal (see clause X.X), using the features **DEPARE** or **DRGARE** in conjunction with the **TUNNEL** feature. There must be no **LNDARE** feature in the area covering the waterway.
- If it is required to encode a waterway inside a tunnel that is not navigable at the optimum display scale for the ENC data, it must be done using the feature **CANALS** in conjunction with the **TUNNEL** feature. A **LNDARE** feature must cover the tunnel. The attributes HORACC, HORCLR, VERACC and VERCLR 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 **LNDARE**, **DEPARE**, **DRGARE** or **UNSARE** features as appropriate.

Distinction: Railway; road.

7 Landmarks

7.1 Landmark

IHO Definition: **LANDMARK**. A prominent object at a fixed location which can be used in determining a location or a direction. (Adapted from IHO Dictionary – S-32, Edition 5; 2643).				
Graphic	**S-101 Geo Feature**	**S-101 Attribute**	**Allowable Encoding Value**	**Attrib. Type**
Real World *Paper Chart Symbol* *ECDIS Symbol*	**LNDMRK** (P, L, A)	CATLMK (M) Category of landmark	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	L
		COLOUR (O) 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	L
		COLPAT (m) Colour pattern	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) ~~6 : border stripe~~	E

		CONDTN (O) Condition	1 : under construction 2 : ruined ~~3 : under reclamation~~ 4 : wingless 5 : planned construction	E
		CONRAD (O) Conspicuous, radar	1 : radar conspicuous ~~2 : not radar conspicuous~~ 3 : radar conspicuous (has radar reflector)	E
		CONVIS (M) Conspicuous, visually	1: visually conspicuous 2: not visually conspicuous	E
		FUNCTN (O) Function	~~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~~	L

			~~43 : passenger terminal building~~ ~~44 : sea rescue control~~ ~~45 : observatory~~ ~~46 : ore crusher~~	
		HEIGHT (O) Height	Unit: Defined in the HUNI subfield of the DSPM record or the HUNITS attribute of the M_UNIT meta feature: metre Resolution: 0·1m Format: xxx.x Example: **73** for a height of 73 metres	F
		NATCON (O) Nature of construction	1 : masonry 2 : concreted 3 : loose boulders ~~4 : hard surfaced~~ ~~5 : unsurfaced~~ 6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted	L
		STATUS (O) 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~~	L
		VERLEN (O) Vertical length	Unit: Defined in the HUNI subfield of the DSPM record or the HUNITS attribute of the M_UNIT meta feature: metre Resolution: 0·1m or 0·1ft Format: xxx.x Example: **24.5** for a vertical length of 24.5 metres	F

Comment [j80]: S-57 Extension 06/01.

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, Edition 5; 601).

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, Edition 5; 1400).

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, Edition 5; 1836). Normally showing a flame and located at refineries (IHO Chart Specifications, S-4).

7) **Mast**

IHO Definition: A relatively tall structure usually held vertical by guy lines. (Adapted from IHO Chart Specifications, S-4).

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.

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, Edition 5; 4415).

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, Edition 5; 4456).

4) **Wingless**

IHO Definition: A windmill or windmotor from which the vanes or turbine blades are missing.

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).

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, Edition 5; 984).

2) **Not visually conspicuous**

IHO Definition: An object which is visible from seaward, but is not conspicuous.

Function: IHO Definition:

20) **Church**

IHO Definition: A building for public Christian worship. (The New Shorter Oxford English Dictionary, 1993).

26) **Mosque**

IHO Definition: A Muslim place of worship. (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, Edition 5; 2917).

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, Edition 5; 4133).

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.

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, Edition 5; 3500).

37) **Time ball**

IHO Definition: A visual time signal in the form of a ball. (IHO Dictionary – S-32, Edition 5; 5536).

38) **Clock**

IHO Definition: Instrument for measuring time and recording hours. (IHO Dictionary – S-32, Edition 5; 833).

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: A equipment or structure to secure an airship. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

Height: IHO Definition: The value of the vertical distance to the highest point of the object, measured from a

specified vertical datum.

Vertical length: IHO Definition: The total vertical length of an object.

Remarks:

- For floating objects: The vertical distance from the surface of water to the highest point of that object.
- For fixed objects: The vertical distance from seabed or ground to the highest point of that object.
- For objects on top of other objects: the vertical distance from the lowest to the highest point of that object.
- Vertical length measurements do not require a datum.

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

7.1.1 Buildings, landmarks, tanks, silos (see S4 – B-370 to B-378)

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 optimum 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.

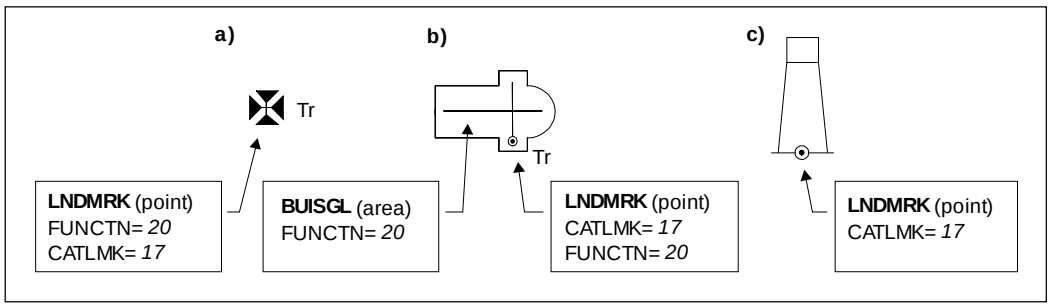
If it is required to encode a landmark (other than a tank or silo), it must be done using the feature **LNDMRK**.

Geo feature: Landmark (**LNDMRK**)

Attributes:					
CATLMK	COLOUR	COLPAT	CONDTN	CONRAD	CONVIS
ELEVAT	HEIGHT	NATCON	NOBJNM	OBJNAM	STATUS
FUNCTN	VERLEN	INFORM	NINFOM	NTXTDS	PICREP
SCAMIN	TXTDSC	RECDAT	RECIND	SORDAT	SORIND

Remarks:

- For buildings, see clause X.X; for silos and tanks, see clause 8.2.
- A ruined landmark should be encoded in the same way as the feature in good condition, but with attribute CONDTN = *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 (VERLEN) or above the general height datum (HEIGHT).
- When a building is shown as an area, 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 **BUISGL** feature of type area for the main building,
  - a **LNDMRK** feature of type point for the prominent feature.



- Not all landmarks are visually conspicuous. If a feature is visually conspicuous (i.e. it is distinctly and noticeably visible from seaward), the attribute CONVIS = *1* (visually conspicuous) must be encoded (see S-4 – B-340).

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

Comment [j81]: MD8 – 7.Cl.4 and 7.Co.16

Comment [j82]: MD8 – 7.Cl.4 and 7.Co.16

7.2 Silo/tank

IHO Definition: **SILO/TANK**. An enclosed container, used for storage. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World	**SILTNK** (P, A)	BUISHP (O) Building shape	~~5 : high-rise building~~ ~~6 : pyramid~~ 7 : cylindrical ~~8 : spherical~~ 9 : cubic	E
Paper Chart Symbol		CATSIL (O) Category of silo/tank	1: silo in general 2: tank in general 3: grain elevator 4: water tower	E
ECDIS Symbol		COLOUR (O) 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	L
		COLPAT (m) Colour pattern	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) ~~6 : border stripe~~	E
		CONDTN (O) Condition	1 : under construction 2 : ruined ~~3 : under reclamation~~ 4 : wingless 5 : planned construction	E
		CONRAD (O) Conspicuous, radar	1 : radar conspicuous ~~2 : not radar conspicuous~~ 3 : radar conspicuous (has radar reflector)	E
		CONVIS (O) Conspicuous, visually	1: visually conspicuous ~~2: not visually conspicuous~~	E

		HEIGHT (O) Height	Unit: Defined in the HUNI subfield of the DSPM record or the HUNITS attribute of the M_UNIT meta feature: metre Resolution: 0·1m Format: xxx.x Example: **73** for a height of 73 metres	F
		NATCON (O) Nature of construction	1 : masonry 2 : concreted ~~3 : loose boulders~~ ~~4 : hard surfaced~~ ~~5 : unsurfaced~~ 6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted	L
		PRODCT (O) 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~~ ~~16 : sawdust/wood chips~~ ~~17 : scrap metal~~ 18 : liquefied natural gas (LNG) 19 : liquefied petroleum gas (LPG) ~~20 : wine~~ ~~21 : cement~~ 22 : grain	L
		STATUS (O) 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~~	L

			~~16 : watched~~ ~~17 : un-watched~~ ~~18 : existence doubtful~~ ~~19 : buoyed~~	

Comment [j83]: S-57 Extension 06/01.

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, Edition 5; 5290).

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** **UP TO HERE 01/04/10.**

   IHO Definition: A tower with an elevated container used to hold water.

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).

7) **Chemicals**

   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).

18) **Liquefied natural gas (LNG)**

   IHO Definition: A compressed gas consisting of flammable light hydrocarbons and derived from natural gas.

19) **Liquefied petroleum gas (LPG)**

   IHO Definition: A compressed gas consisting of flammable light hydrocarbons and derived from petroleum. (Adapted from 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).

INT 1 Reference: E 2, 32-33

7.2.1 Buildings, landmarks, tanks, silos (see M4 – B-370 to B-378)

If it is required to encode a tank or silo, it must be done using the feature **SILTNK**.

Geo feature: Silo / tank (**SILTNK**)

Attributes:						
	BUISHP	CATSIL	COLOUR	COLPAT	CONDTN	CONRAD
	CONVIS	ELEVAT	HEIGHT	NATCON	NOBJNM	OBJNAM
	PRODCT	STATUS	VERLEN	INFORM	NINFOM	NTXTDS
	PICREP	SCAMIN	TXTDSC	RECDAT	RECIND	SORDAT
	SORIND					

Remarks:

- For buildings, see clause X.X; for landmarks, see clause X.X.

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

7.3 Fortified structure

IHO Definition: **FORTIFIED STRUCTURE**. A structure for the military defence of a site. (S-57, Appendix A – Chapter 1, Edition 3.1, Page 1.76, November 2000).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**FORSTC** (P, L, A)	CATFOR (O) Category of fortified structure	1 : castle 2 : fort 3 : battery 4 : blockhouse 5 : Fortified tower 6 : redoubt 8 : fortified submarine shelter	E
		CONDTN (O) Condition	1 : under construction 2 : ruined ~~3 : under reclamation~~ ~~4 : wingless~~ 5 : planned construction	E
		CONRAD (O) Conspicuous, radar	1 : radar conspicuous ~~2 : not radar conspicuous~~ 3 : radar conspicuous (has radar reflector)	E
		CONVIS (O) Conspicuous, visually	1: visually conspicuous ~~2: not visually conspicuous~~	E
		HEIGHT (O) Height	Unit: Defined in the HUNI subfield of the DSPM record or the HUNITS attribute of the M_UNIT meta feature: metre Resolution: 0·1m Format: xxx.x Example: **73** for a height of 73 metres	F
		NATCON (O) Nature of construction	1 : masonry 2 : concreted ~~3 : loose boulders~~ ~~4 : hard surfaced~~ ~~5 : unsurfaced~~ 6 : wooden 7 : metal ~~8 : glass reinforced plastic (GRP)~~ 9 : painted	L
		STATUS (O) Status	~~1 : permanent~~ ~~2 : occasional~~ ~~3 : recommended~~ 4 : not in use ~~5 : periodic/intermittent~~ ~~6 : reserved~~	L

Comment [j84]: MD8 – 7.Co.1

Comment [j85]: Extension 6/01

Comment [j86]: Extension 6/01

			~~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~~	

Comment [j87]: S-57 Extension 06/01.

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 tower or a small round fort (e.g. Martello tower) for coastal defence.

Comment [j88]: MD8 – 7.Co.1

6) **Redoubt**

   IHO Definition: An outwork or fieldwork usually square or polygonal and without flanking defences. (Concise Oxford Dictionary).

8) **Fortified submarine shelter**

   IHO Definition: Not currently defined.

INT 1: E 34.1-3

7.3.1 Fortified structures (see S-4 – B-379)

If it is required to encode a fortified structure, it must be done using the feature **FORSTC**.

Geo feature: Fortified structure (**FORSTC**)

Attributes:

CATFOR	CONDTN	CONRAD	CONVIS	HEIGHT	NATCON
NOBJNM	OBJNAM	STATUS	VERLEN	INFORM	NINFOM
NTXTDS	PICREP	SCAMIN	TXTDSC	RECDAT	RECIND
SORDAT	SORIND				

Comment [j89]: S-57 Extension 06/01.

Remarks:

- A fortified structure is often disused, decayed or used for non-defence purpose. Such structures range from major castles and forts to minor lookout posts. (IHO Chart Specifications, S-4).

Comment [j90]: S-57 App A, Ch 1 – 1.76.

Distinction: Building, single; landmark.

7.4 Production/storage area

IHO Definition: **PRODUCTION/STORAGE AREA**. An area on land for the exploitation or storage of natural resources. (S-57, Appendix A – Chapter 1, Edition 3.1, Page 1.124, November 2000).				
Graphic	**S-101 Geo Feature**	**S-101 Attribute**	**Allowable Encoding Value**	**Attrib. Type**
Real World *Paper Chart Symbol* *ECDIS Symbol*	**PRDARE** (P, A)	CATPRA (M) Category of production area	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	E
		CONDTN (O) Condition	1 : under construction 2 : ruined ~~3 : under reclamation~~ ~~4 : wingless~~ 5 : planned construction	E
		CONRAD (O) Conspicuous, radar	1 : radar conspicuous ~~2 : not radar conspicuous~~ 3 : radar conspicuous (has radar reflector)	E
		CONVIS (O) Conspicuous, visually	1: visually conspicuous ~~2: not visually conspicuous~~	E
		PRODCT (O) 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 16 : sawdust/wood chips 17 : scrap metal 18 : liquefied natural gas (LNG) 19 : liquefied petroleum gas (LPG) ~~20 : wine~~ 21 : cement 22 : grain	L

		STATUS (O) 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~~	L

Comment [j91]: S-57 Extension 06/01.

Category of production area: IHO Definition:

1) **Quarry**

   IHO Definition: An excavation in solid rock from which building stone, limestone, etc. is removed.

2) **Mine**

   IHO Definition: An excavation in the earth for the purpose of extracting earth materials.

3) **Stockpile**

   IHO Definition: A reserve stock of material, equipment or other supplies.

4) **Power station area**

   IHO Definition: A stationary plant containing apparatus for large-scale conversion of some form of energy (hydraulic, steam, chemical, nuclear, etc.) into electrical energy.

5) **Refinery area**

   IHO Definition: A system of process units used to convert crude petroleum into fuels, lubricants and other petroleum-derived products.

6) **Timber yard**

   IHO Definition: A storage area for wood used for building, carpentry or joinery.

7) **Factory area**

   IHO Definition: A group of buildings where goods are manufactured.

8) **Tank farm**

   IHO Definition: An area in which a number of large-capacity storage tanks are located, generally used for crude oil or petroleum products.

9) **Wind farm**

   IHO Definition: An area in which numerous wind motors are located.

10) **Slag heap/spoil heap**

   IHO Definition: Hill of refuse from a mine, industrial plant etc. on land. (Adapted from Concise Oxford Dictionary).

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, Edition 5; 5059).

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 form 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).

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: A compressed gas consisting of flammable light hydrocarbons and derived from natural gas.

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).

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).

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

7.4.1 Production and storage areas (see S-4 – B-367)

If it is required to encode production or storage area, it must be done using the feature **PRDARE**.

Geo feature: Production / storage area (**PRDARE**)

Attributes:

CATPRA	CONDTN	CONRAD	CONVIS	DATEND	DATSTA
ELEVAT	HEIGHT	NOBJNM	OBJNAM	PRODCT	STATUS
VERLEN	INFORM	NINFOM	NTXTDS	PICREP	SCAMIN
TXTDSC	RECDAT	RECIND	SORDAT	SORIND	

Remarks:

- If there are individual buildings or equipment features contained within this area, they should be encoded as separate features such as **BUISGL, CRANES, LNDMRK** or **SILTNK** within the **PRDARE** area feature.
- If visible from seaward, a quarry face should be encoded in a similar way to a cliff (see clause X.X), with attribute CATSLO = *6* (cliff).

Distinction: Free port area; offshore production area.

8 Ports

8.1 Checkpoint

IHO Definition: **CHECKPOINT**. An official place to register, declare or check goods and people. (S-57, Appendix A – Chapter 1, Edition 3.1, Page 1.36, November 2000).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World	**CHKPNT** (P, A)	CATCHP (O) Category of checkpoint	1 : custom	E
Paper Chart Symbol *ECDIS Symbol*		STATUS (O) 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~~	L

Comment [j92]: S-57 Extension 06/01.

Category of checkpoint: IHO Definition:

1) **Custom**

IHO Definition: An office, especially in ports, at which customs dues are collected or administrated. (Adapted from The New Shorter Oxford English Dictionary, 1993).

INT 1 Reference: Not specified

8.1.1 Checkpoints

If it is required to encode an official place to register, declare and/or check goods and people, it must be done using the feature **CHKPNT**.

Geo feature: Caution area, (**CHKPNT**)

Attributes: CATCHP NOBJNM OBJNAM STATUS INFORM NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND SORDAT SORIND

Remarks:

- The **CHKPNT** must only be used to encode the function. In addition, if it is required to encode a physical feature (e.g. building), it must be done using an appropriate feature (e.g. **BUISGL**, **LNDMRK**).

Distinction: Custom zone.

8.2 Hulks

IHO Definition: **HULK**. A permanently moored ship. (S-57, Appendix A – Chapter 1, Edition 3.1, Page 1.83, November 2000).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World	**HULKES** (P, A)	CATHLK (O) Category of hulk	1 : floating restaurant 2 : historic ship 3 : museum 4 : accommodation 5 : floating breakwater	L
Paper Chart Symbol *ECDIS Symbol*		COLOUR (O) 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	L
		COLPAT (m) Colour pattern	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) ~~6 : border stripe~~	E
		CONDTN (O) Condition	1 : under construction 2 : ruined ~~3 : under reclamation~~ 4 : wingless 5 : planned construction	E
		CONRAD (O) Conspicuous, radar	1 : radar conspicuous ~~2 : not radar conspicuous~~ 3 : radar conspicuous (has radar reflector)	E
		CONVIS (M) Conspicuous, visually	1: visually conspicuous ~~2: not visually conspicuous~~	E

Category of hulk: IHO Definition:

1) **Floating restaurant**

   IHO Definition: A permanently moored floating structure, such as an old ship, used as a restaurant.

2) **Historic ship**

IHO Definition: A ship of historical interest permanently moored as a tourist attraction.

3) **Museum**

IHO Definition: A permanently moored floating structure, such as an old ship, used as a museum.

4) **Accommodation**

IHO Definition: A permanently moored floating structure, such as an old ship, used for accommodation.

5) **Floating breakwater**

IHO Definition: A permanently moored floating structure, often constructed from old ships, used as a breakwater.

INT 1 Reference: F 34

8.2.1 Hulks

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

Geo feature:	Hulk (**HULKES**)					
Attributes:	CATHLK	COLOUR	COLPAT	CONDTN	CONRAD	CONVIS
	HORLEN	HORWID	NOBJNM	OBJNAM	VERLEN	INFORM
	NINFOM	NTXTDS	PICREP	SCAMIN	TXTDSC	RECDAT
	RECIND	SORDAT	SORIND			

Remarks:

- **HULKES** features of type area are part of Group 1.

Distinction: Custom zone.

8.3 Piles

IHO Definition: **PILE**. A long heavy timber or section of steel, wood, concrete, etc., forced into the earth which may serve as a support, as for a pier, or a free standing pole within a marine environment. (IHO Dictionary – S-32, Edition 5; 3840).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World  Piles *Photograph, courtesy of the Pacific Hydrographic Branch*  Piles *Photograph, courtesy of the Pacific Hydrographic Branch* *Paper Chart Symbol* *ECDIS Symbol*	**PILPNT** (P)	CATPLE (O) Category of pile	1 : stake 3 : post 4 : tripodal 5 : piling 6 : row of piles	E
		COLOUR (O) 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	L
		COLPAT (m) Colour pattern	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) ~~6 : border stripe~~	E
		CONDTN (O) Condition	1 : under construction 2 : ruined ~~3 : under reclamation~~ 4 : wingless 5 : planned construction	E
		CONRAD (O) Conspicuous, radar	1 : radar conspicuous ~~2 : not radar conspicuous~~ 3 : radar conspicuous (has radar reflector)	E
		CONVIS (M) Conspicuous, visually	1: visually conspicuous ~~2: not visually conspicuous~~	E

Comment [j93]: Extension 6/01.

Comment [j94]: Extension 6/01.

Category of pile: IHO Definition:

1) **Stake**

IHO Definition: An elongated wood or metal pole embedded in the bottom to serve as a marker or support. (Adapted from IHO Dictionary – S-32, Edition 5; 4960).

3) **Post**

IHO Definition: A vertical piece of timber, metal or concrete forced into the earth or sea bed.

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 sea bed. (Adapted from IHO Dictionary – S-32, Edition 5; 3840).

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, Edition 5; 3841).

6) **Row of piles**

IHO Definition: A number of piles, usually in a straight line, but not connected by structural members (Australian Hydrographic Service).

INT 1 Reference: F 22

8.3.1 Piles

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

Geo feature: Pile (**PILPNT**)

Attributes:						
	CATPLE	COLOUR	COLPAT	CONDTN	CONVIS	DATEND
	DATSTA	HEIGHT	NOBJNM	OBJNAM	VERLEN	INFORM
	NINFOM	NTXTDS	SCAMIN	TXTDSC	RECDAT	RECIND
	SORDAT	SORIND				

Remarks:

- Stumps of piles or posts that are dangerous to navigation must be encoded using **OBSTRN** features, with attribute CATOBS = *1* (snag/stump), and must not be encoded using **PILPNT**.
- See clause X.X for details of how to encode a pile or post that is used as a mooring/warping facility.

1) All lights at a fixed position in the water with no known structure feature, **MUST** use **PILPNT** as the master feature.

2) **WHEN** there is a stand alone fog signal and no structure associated with it, a **PILPNT** feature **MUST** be created as the master feature.

Comment [j95]: NOAA Encoding Guide

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

8.4 Dyke

IHO Definition: **DYKE**. A dyke (or dike) is an artificial embankment to contain or hold back water. (IHO Dictionary – S-32, Edition 5; 1361).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World	**DYKCON** (L, A)	CONDTN (O) Condition	1 : under construction 2 : ruined 3 : under reclamation ~~4 : wingless~~ 5 : planned construction	E
Paper Chart Symbol		CONRAD (O) Conspicuous, radar	1 : radar conspicuous ~~2 : not radar conspicuous~~ 3 : radar conspicuous (has radar reflector)	E
ECDIS Symbol		NATCON (O) Nature of construction	1 : masonry 2 : concreted ~~3 : loose boulders~~ ~~4 : hard surfaced~~ ~~5 : unsurfaced~~ ~~6 : wooden~~ ~~7 : metal~~ ~~8 : glass reinforced plastic (GRP)~~ 9 : painted	L

INT 1 Reference: F 1

8.4.1 Dykes (see S-4 – B-313.1)

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

Geo feature: Dyke (**DYKCON**)
Attributes: CONDTN CONRAD DATEND DATSTA HEIGHT NATCON VERLEN INFORM NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND SORDAT SORIND

Remarks:
- If it is required to encode a dyke whose seaward edge is coincident with the coastline, it must be done using **DYKCON**, and with a **SLCONS** feature of type line along its seaward edge, with no value populated for attribute CATSLC.
- When a **DYKCON** feature is of type area, it must be covered by a **LNDARE** feature.
- At large compilation scales, the dyke crown (the topline of the dyke) may be encoded as a **SLOTOP** feature, with attribute CATSLO = *2* (embankment).

Distinction: Dam; sloping ground; slope top line.

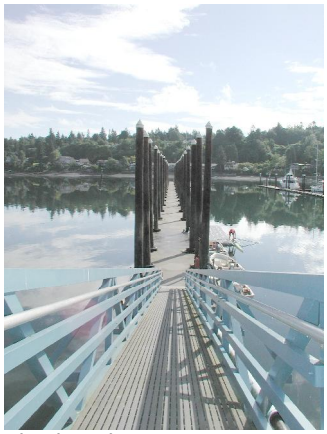
8.5 Shoreline construction

IHO Definition: **SHORELINE CONSTRUCTION**. A fixed artificial structure in the water and/or adjoining the land. It may also refer to features such as training walls, which are not necessarily connected to, nor form part of the shoreline.

Comment [j96]: MD8 – 3.Cl.4 and 3.Co.3

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World  Breakwater *Photograph, courtesy of the Pacific Hydrographic Branch*  Boat Ramp *Photograph, courtesy of the Pacific Hydrographic Branch*  Rip Rap *Photograph, courtesy of the Pacific Hydrographic Branch*  Sea Wall *Photograph, courtesy of the Pacific*	**SLCONS** (P, L, A)	CATSLC (O) Category of shoreline construction	1 : breakwater 2 : groyne (groin) 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	E
		COLOUR (O) 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	L
		COLPAT (m) Colour pattern	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) ~~6 : border stripe~~	E
		CONDTN (O) Condition	1 : under construction 2 : ruined 3 : under reclamation ~~4 : wingless~~ 5 : planned construction	E
		CONRAD (O) Conspicuous,	1 : radar conspicuous ~~2 : not radar conspicuous~~	E

Comment [j97]: Extension 6/01.

Hydrographic Branch  Floating Pier *Photograph, courtesy of the Pacific Hydrographic Branch*  Wharf *Photograph, courtesy of the Pacific Hydrographic Branch*  Pier *Photograph, courtesy of the Atlantic Hydrographic Branch* *Paper Chart Symbol* *ECDIS Symbol*		radar	3 : radar conspicuous (has radar reflector)	
		CONVIS (M) Conspicuous, visually	1: visually conspicuous ~~2: not visually conspicuous~~	E
		NATCON (O) Nature of construction	1 : masonry 2 : concreted 3 : loose boulders 4 : hard surfaced ~~5 : unsurfaced~~ 6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted	L
		STATUS (O) 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~~	L
		WATLEV (O) Water level effect	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	E
Category of shoreline construction: IHO Definition:				

Comment [j98]: S-57 Extension 06/01.

1) **Breakwater**

IHO Definition: A structure protecting a shore area, harbour, anchorage, or basin from waves. (IHO Dictionary – S-32, Edition 5; 542).

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, Edition 5; 2525 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. (IHO Chart Specifications, S-4).

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, Edition 5; 3833).

5) **Promenade pier**

IHO Definition: A pier built only for recreational purposes. (IHO Chart Specifications, S-4).

6) **Wharf (quay)**

IHO Definition: A structure serving as a berthing place for vessels. (IHO Dictionary – S-32, Edition 5; 5985).

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, Edition 5; 5586 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, Edition 5; 4379).

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, Edition 5; 4584).

11) **Landing steps**

IHO Definition: Steps at the shoreline as the connection between land and water on different levels.

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, Edition 5; 4209).

13) **Slipeway**

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, Edition 5; 4775).

14) **Fender**

IHO Definition: A protective structure designed to cushion the impact of a vessel and prevent damage.

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.

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).

Comment [j99]: Extension 6/01.

Water level effect: IHO Definition:

Remarks:

- The attribute "water level effect" encodes the effect of the surrounding water on an object.

1) **Partly submerged at high water**

IHO Definition: Partially covered and partially dry at high water.

2) **Always dry**

IHO Definition: Not covered at high water under average meteorological conditions.

3) **Always under water / submerged**

IHO Definition: Remains covered by water at all times under average meteorological conditions.

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, Edition 5; 1111).

5) **Awash**

IHO Definition: Flush with, or washed by the waves at low water under average meteorological conditions. (Adapted from IHO Dictionary – S-32, Edition 5; 308).

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).

INT 1 Reference: F 2.1-6.3, 12-15, 23-26, 30-33.2

8.5.1 Coastline

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

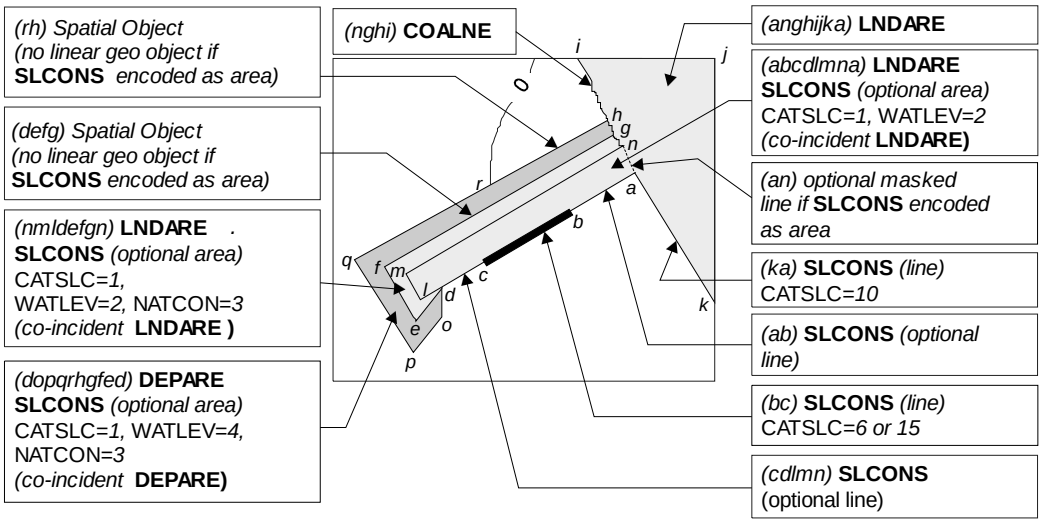
These features form the border of the land area (**LNDARE**) feature.

8.5.2 Artificial coastline (see S-4 – B-313 and B-320)

Geo feature: Shoreline construction (**SLCONS**)

Attributes:	CATSLC	COLOUR	COLPAT	CONDTN	CONRAD	CONVIS
	DATEND	DATSTA	HEIGHT			
	HORACC -	applies to HORCLR				
	HORCLR	HORLEN	HORWID	NATCON	NOBJNM	OBJNAM
	STATUS	VERLEN	WATLEV	INFORM	NINFOM	NTXTDS
	SCAMIN	TXTDSC	RECDAT	RECIND	SORDAT	SORIND

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 parts of the shoreline construction may be encoded as separate **SLCONS** features of type area, and the masked line (an) is optional. Alternatively, the boundaries of the shoreline construction may be encoded as **SLCONS** features of type line, and, if part of the **SLCONS** boundary has a different characteristic (e.g. (bc) attribute CATSLC = *6* or *15*), it should be encoded as a separate **SLCONS** feature of type line.
- In this example, the shoreline construction area above the high water line must also be covered by a **LNDARE** feature of type area, and the intertidal shoreline construction area must also be covered by a **DEPARE** feature of type area.
- **SLCONS** features should be broken into their constituent parts, and categorised using attributes such as CATSLC and WATLEV 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 **CTNARE** feature with the textual reference encoded using the attribute INFORM.
- Intertidal or submerged artificial rock walls, such as training walls that are not attached to the shoreline, should be encoded using the appropriate value for CATSLC, and WATLEV = *3* (always under

water/submerged) or WATLEV = *4* (covers and uncovers).

Distinction: Canal bank; coastline; lake shore; land area; pontoon; river bank.

8.6 Causeway

IHO Definition: **CAUSEWAY**. A raised way across low or wet ground or water. (IHO Dictionary – S-32, Edition 5; 662).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World	**CAUSWY** (L, A)	CONDTN (O) Condition	1 : under construction 2 : ruined 3 : under reclamation ~~4 : wingless~~ 5 : planned construction	E
Paper Chart Symbol *ECDIS Symbol*		NATCON (O) Nature of construction	1 : masonry 2 : concreted 3 : loose boulders 4 : hard surfaced ~~5 : unsurfaced~~ 6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted	L
		STATUS (O) 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~~	L
		WATLEV (O) Water level effect	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~~	E

Comment [j100]: S-57 Extension 06/01.

INT 1 Reference: F 3

8.6.1 Causeways

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

Geo feature:	Causeway (**CAUSWY**)					
Attributes:	CONDTN	NATCON	NOBJNM	OBJNAM	STATUS	WATLEV
	INFORM	NINFOM	NTXTDS	SCAMIN	TXTDSC	RECDAT
	RECIND	SORDAT	SORIND			

Remarks:

Distinction: Dam; road.

8.7 Canal

IHO Definition: **CANAL**. 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).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World	**CANALS** (L, A)	CATCAN (O) Category of canal	1 : transportation 2 : drainage 3 : irrigation	E
Paper Chart Symbol		CONDTN (O) Condition	1 : under construction ~~2 : ruined~~ ~~3 : under reclamation~~ ~~4 : wingless~~ 5 : planned construction	E
ECDIS Symbol		STATUS (O) 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~~	L

Comment [j101]: S-57 Extension 06/01.

Category of canal: IHO Definition:

1) **Transportation**

   IHO Definition: A canal used for navigation as part of a transport system.

2) **Drainage**

   IHO Definition: A canal used to drain excess water from surrounding land.

3) **Irrigation**

   IHO Definition: A canal used to supply water for the purpose of irrigation.

INT 1 Reference: F 40

8.7.1 Canals (see S-4 – B-361)

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

Geo feature: Canal (**CANALS**)
Attributes: CATCAN CONDTN DATEND DATSTA
HORACC - applies only to HORCLR
HORCLR HORWID NOBJNM OBJNAM STATUS INFORM

NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND
SORDAT SORIND

Remarks:

- If the canal is navigable at the optimum display scale for the ENC data, it must be encoded using the features **DEPARE** or **DRGARE** (see clause X.X), and the canal banks must be encoded using the features **COALNE** or **SLCONS**. The canal must not be encoded as a **CANALS** feature. If it is required to encode the name of the canal, it must be done using a **SEAARE** feature, with attribute CATSEA = *51* (canal).
- If it is required to encode a canal that is not navigable at the optimum display scale for the ENC data, it must be done using **CANALS**, covered by a **LNDARE** or **UNSARE** feature. The name of the canal should be encoded using the attribute OBJNAM on the **CANALS** feature.

Distinction: ~~Canal bank;~~ River; lake; tideway.

8.8 Distance mark

IHO Definition: **DISTANCE MARK**. A distance mark indicates the distance measured from an origin and consists of either a solid visible structure or a distinct location without special installation. Usually found on canals. (S-57, Appendix A – Chapter 1, Edition 3.1, Page 1.55, November 2000).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**DISMAR** (P)	CATDIS (O) Category of distance mark	1 : distance mark not physically installed 2 : visible mark, pole 3 : visible mark, board 4 : visible mark, unknown shape	E

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.

2) **Visible mark, pole**

   IHO Definition: A point at which a distance from an origin along a feature is given for information and which is marked by a pole.

3) **Visible mark, board**

   IHO Definition: A point at which a distance from an origin along a feature is given for information and which is marked by a board.

4) **Visible mark, unknown shape**

   IHO Definition: a point at which a distance from an origin along a feature is given for information and which is physically marked, but the shape of the mark is not known or not given.

INT 1 Reference: F 40

8.8.1 Distance marks (see S-4 – B-307)

If it is required to encode a distance mark, it must be done using the feature **DISMAR**.

Geo feature: Distance mark (**DISMAR**)
Attributes: CATDIS DATEND DATSTA NOBJNM OBJNAM
INFORM - the value of distance with its unit of measurement
NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND
SORDAT SORIND

Remarks:

Distinction: Beacon, special purpose.

8.9 Gate

IHO Definition: **GATE**. A structure that may be swung, drawn, or lowered to block an entrance or passageway. (United States Geological Survey, Jan.89).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World	**GATCON** (P, L, A)	CATGAT (O) Category of gate	2 : flood barrage gate 3 : caisson 4 : lock gate 5 : dyke gate 6 : sluice	E
Paper Chart Symbol		CONDTN (m) Condition	1 : under construction 2 : ruined ~~3 : under reclamation~~ ~~4 : wingless~~ 5 : planned construction	E
ECDIS Symbol		DRVAL1 (O) Depth range value 1	Unit: Defined in the DUNI subfield of the DSPM record or the DUNITS attribute of the M_UNIT meta feature: metre Resolution: 0·1m Format: sxxxxx.x s: sign, negative values only Example: **50** for a minimum depth of 50 metres	F
		HORCLR (O) Horizontal clearance	Unit: Defined in the HUNI subfield of the DSPM record or the HUNITS attribute of the M_UNIT meta feature: metre Resolution: 0·1m Format: xxx.x Example: **125** for a width of 125 metres	F
		NATCON (O) Nature of construction	1 : masonry 2 : concreted ~~3 : loose boulders~~ ~~4 : hard surfaced~~ ~~5 : unsurfaced~~ 6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted	L
		STATUS (O) Status	~~1 : permanent~~ ~~2 : occasional~~ ~~3 : recommended~~ 4 : not in use ~~5 : periodic/intermittent~~ ~~6 : reserved~~	L

			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~~	

Comment [j102]: S-57 Extension 06/01.

Category of gate: IHO Definition:

2) **Flood barrage gate**

IHO Definition: An opening gate used to control flood water.

3) **Caisson**

IHO Definition: A steel structure used for closing the entrance of locks, wet and dry docks. (IHO Dictionary – S-32, Edition 5; 602).

4) **Lock gate**

IHO Definition: Lock gates are the massive hinged doors at each end of a lock. (Adapted from IHO Dictionary – S-32, Edition 5; 2882).

5) **Dyke gate**

IHO Definition: An opening gate in a dyke.

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, Edition 5; 4783)..

Depth range value 1: IHO Definition: The minimum (shoalest) value of a depth range.

Remarks:

- Where the area dries, the value is negative.

Comment [j103]: S-57 App A, Ch 2 – 2.124.

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.

INT 1 Reference: F 27, 41.1-2, 42-43

8.9.1 Gates (see S-4 – B-326.5 to B-326.7)

If it is required to encode a gate that controls the flow of water, it must be done using the feature **GATCON**.

Geo feature: Gate (**GATCON**)
Attributes: CATGAT CONDTN
DRVAL1 - minimum depth over the sill
HORACC - applies only to HORCLR
HORCLR NATCON NOBJNM OBJNAM QUASOU SOUACC
STATUS
VERACC - applies only to VERCLR
VERCLR
VERDAT - applies only to VERCLR (not DRVAL1)
INFORM NINFOM NTXTDS SCAMIN TXTDSC RECDAT
RECIND SORDAT SORIND

GATCON of type area must also be covered by a **DEPARE** or **LNDARE** feature. Remarks: Distinction: Dry dock; floating dock.

8.10 Dam

IHO Definition: **DAM**. A barrier to check or confine anything in motion; particularly one constructed to hold back water and raise its level to form a reservoir, or to prevent flooding. (IHO Dictionary – S-32, Edition 5; 1196).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**DAMCON** (P, L, A)	CATDAM (O)	1 : weir 2 : dam 3 : flood barrage	E
		COLOUR (O) 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	L
		COLPAT (m) Colour pattern	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	E
		CONDTN (O) Condition	1 : under construction 2 : ruined ~~3 : under reclamation~~ ~~4 : wingless~~ 5 : planned construction	E
		CONRAD (O) Conspicuous, radar	1 : radar conspicuous ~~2 : not radar conspicuous~~ ~~3 : radar conspicuous (has radar reflector)~~	E
		CONVIS (O) Conspicuous, visually	1: visually conspicuous ~~2: not visually conspicuous~~	E
		NATCON (O) Nature of construction	1 : masonry 2 : concreted ~~3 : loose boulders~~ ~~4 : hard surfaced~~ ~~5 : unsurfaced~~ ~~6 : wooden~~ ~~7 : metal~~ ~~8 : glass reinforced plastic (GRP)~~	L

Comment [j104]: Should not be allowed for S-101 ENCs – does not display in ECDIS. Refer ENC EB 29.

			9 : painted	
		STATUS (O) 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~~	L

Comment [j105]: S-57 Extension 06/01.

Comment [j106]: S-57 Extension 06/01.

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, Edition 5; 5967).

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, Edition 5; 1196).

3) **Flood barrage**

IHO Definition: an opening dam across a channel which, when required, is closed to control flood waters. (IHO Chart Specifications, S-4 326.7).

INT 1 Reference: F 44

8.10.1 Dams (see S-4 – B-364.2)

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

Geo feature: Dam (**DAMCON**)

Attributes:

CATDAM	COLOUR	COLPAT	CONDTN	CONRAD	CONVIS
DATEND	DATSTA	HEIGHT	NATCON	NOBJNM	OBJNAM
VERLEN	INFORM	NINFOM	NTXTDS	SCAMIN	TXTDSC
RECDAT	RECIND	SORDAT	SORIND		

STATU

Comment [j107]: Extension 6/01.

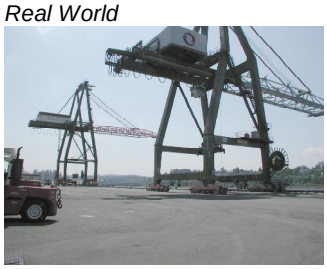
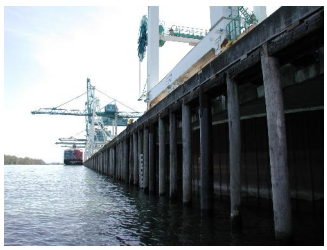
Remarks:

- When a **DAMCON** feature is of type area, it must be covered by a **LNDARE** feature.
- The geometry of the dam includes any gates. Gates should be encoded as separate **GATCON** features.
- If it is required to encode a dam whose seaward edge is coincident with the coastline, it must be done using **DAMCON**, with a **SLCONS** feature of type line along its seaward edge, with no value populated for the attribute CATSLC.

Distinction: Causeway; dyke; road.

8.11 Crane

IHO Definition: **CRANE**. A machine for lifting, shifting and lowering objects or materials by means of a swinging boom or with a lifting apparatus supported on an overhead track. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World  Cargo Cranes *Photograph, courtesy of the Pacific Hydrographic Branch*  Cargo Cranes *Photograph, courtesy of the Pacific Hydrographic Branch* *Paper Chart Symbol* *ECDIS Symbol*	**CRANES** (P)	CATCRN (O) Category of crane	2 : container crane/gantry 3 : sheerlegs 4 : traveling crane 5 : A-frame	E
		COLOUR (O) 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	L
		COLPAT (m) Colour pattern	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	E
		CONDTN (O) Condition	1 : under construction 2 : ruined ~~3 : under reclamation~~ ~~4 : wingless~~ 5 : planned construction	E
		CONRAD (O) Conspicuous, radar	1 : radar conspicuous ~~2 : not radar conspicuous~~ ~~3 : radar conspicuous (has radar reflector)~~	E
		CONVIS (O) Conspicuous, visually	1: visually conspicuous ~~2: not visually conspicuous~~	E
		LIFCAP (O) Lifting capacity	Unit: Tonne (t) Resolution: 0·1t Format: xxx.x Example: **120** for a lifting capacity of 120 tonnes	F

		ORIENT (O) Orientation	Unit: Degree (°) – minimum value 0; maximum value 360 Resolution: 0·01° Format: xxx.xX Example: **246.7** for an orientation of 246·7 degrees	F
		RADIUS (O) Radius	Unit: Defined in the HUNI subfield of the DSPM record or the HUNITS attribute of the M_UNIT meta feature: metre Resolution: 0·1m Format: xxx.x Example: **26** for a radius of 26 metres	F
		STATUS (O) 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~~	L

Comment [j108]: S-57 Extension 06/01.

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.

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).

Lifting capacity: IHO Definition: The specific safe lifting capacity of an object.

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).

Radius: IHO Definition: The vector extending from the centre to the periphery of a circular or spherical object.

INT 1 Reference: F 53.1-3

8.11.1 Cranes (see S-4 – B-328.3)

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

Geo feature: Crane (**CRANES**)

Attributes:

CATCRN	COLOUR	COLPAT	CONDTN	CONRAD	CONVIS
HEIGHT	LIFCAP	NOBJNM	OBJNAM		
ORIENT -	angular distance from true north to the axis of the crane's jib (generally perpendicular to the wharf)				
RADIUS	STATUS				
VERACC -	applies only to VERCLR (not HEIGHT)				
VERCLR					
VERDAT -	applies only to VERCLR (not HEIGHT)				
VERLEN	INFORM	NINFOM	NTXTDS	PICREP	SCAMIN
TXTDSC	RECDAT	RECIND	SORDAT	SORIND	

Remarks:

- 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 **RAILWY** (see clause X.X).

Distinction:

8.12 Berth

IHO Definition: **BERTH**. A named or numbered place where a vessel is moored at a wharf. (IHO Dictionary – S-32, Edition 5; 470).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**BERTHS** (P, L, A)	DRVAL1 (O) Depth range value 1	Unit: Defined in the DUNI subfield of the DSPM record or the DUNITS attribute of the M_UNIT meta feature: metre Resolution: 0·1m Format: sxxxxx.x s: sign, negative values only Example: **50** for a minimum depth of 50 metres	F
		OBJNAM (M) Object name		S
		QUASOU (O) Quality of sounding measurement	1 : depth known 2 : 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	L
		STATUS (O) 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~~	L

Comment [j109]: S-57 Extension 06/01.

Depth range value 1: IHO Definition: The minimum (shoalest) value of a depth range.

Remarks:

- Where the area dries, the value is negative.

Comment [j110]: S-57 App A, Ch 2 – 2.124.

Object name: IHO Definition: The individual name of an object.

Quality of sounding measurement: IHO Definition:

2) **Depth known**

IHO Definition: The depth from chart datum to the bottom is a known value.

3) **Depth unknown**

IHO Definition: The depth from chart datum to the bottom is unknown.

6) **Least depth known**

IHO Definition: The shoalest depth over a feature is of known value. (Adapted from IHO Dictionary – S-32, Edition 5; 2705).

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.

10) **Maintained depth**

IHO Definition: The depth at which a channel is kept by human influence, usually by dredging. (IHO Dictionary – S-32, Edition 5; 3057).

11) **Not regularly maintained**

IHO Definition: Depths may be altered by human influence, but will not be routinely maintained.

INT 1 Reference: F 19

8.12.1 Berths (see S-4 – B-323)

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

Geo feature: Berth (**BERTHS**)

Attributes:
DATEND DATSTA
DRVAL1 - minimum depth at the berth
NOBJNM
OBJNAM - name or number of the berth
PEREND PERSTA QUASOU SOUACC STATUS
INFORM - maximum draft permitted at the berth (e.g. *Maximum draft permitted = 14 metres*)
NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND
SORDAT SORIND

Remarks:

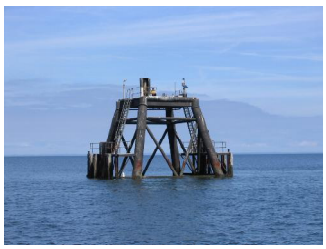
- The berth encodes the named place where a vessel can be moored adjacent to a shoreline construction. The shoreline construction itself should be encoded using the feature **SLCONS** (see clause X.X).
- Landing places for boats should be encoded as small craft facilities (see clause 4.6.5).

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

8.13 Mooring/warping facility

IHO Definition: **MOORING/WARPING FACILITY**. The equipment or structure used to secure a vessel. (Adapted from IHO Dictionary – S-32, 3322).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World  Dolphin *Photograph, courtesy of the Pacific Hydrographic Branch*  Bollard *Photograph, courtesy of the Pacific Hydrographic Branch*  Mooring Buoy *Photograph, courtesy of the Atlantic Hydrographic Branch*	**MORFAC** (P, L, A)	BOYSHP (O) Buoy shape	1 : conical (nun, ogival) 2 : can (cylindrical) 3 : spherical 4 : pillar 5 : spar (spindle) 6 : barrel (tun) 7 : super-buoy 8 : ice buoy	E
		CATMOR (M) Category of mooring / warping facility	1 : dolphin 2 : deviation dolphin 3 : bollard 4 : tie-up wall 5 : post or pile 6 : chain/wire/cable 7 : mooring buoy	E
		COLOUR (O) 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	L
		COLPAT (m) Colour pattern	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	E
		CONDTN (O) Condition	1 : under construction 2 : ruined ~~3 : under reclamation~~ ~~4 : wingless~~ 5 : planned construction	E
		CONRAD (O) Conspicuous, radar	1 : radar conspicuous ~~2 : not radar conspicuous~~ 3 : radar conspicuous (has radar reflector)	E

 Mooring Facility *Photograph, courtesy of the Atlantic Hydrographic Branch*  Mooring Buoy *Photograph, courtesy of the Atlantic Hydrographic Branch*  Mooring Facility *Photograph, courtesy of the Atlantic Hydrographic Branch*  Dolphin *Photograph, courtesy of the Atlantic Hydrographic Branch* *Paper Chart Symbol*		CONVIS (O) Conspicuous, visually	1: visually conspicuous ~~2: not visually conspicuous~~	E
		NATCON (O) Nature of construction	1 : masonry 2 : concreted ~~3 : loose boulders~~ ~~4 : hard surfaced~~ ~~5 : unsurfaced~~ ~~6 : wooden~~ ~~7 : metal~~ ~~8 : glass reinforced plastic (GRP)~~ 9 : painted	L
		STATUS (O) 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~~	L
		WATLEV (O) Water level effect	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	E

Comment [j111]: S-57 Extension 06/01.

ECDIS Symbol				

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. (IHO Dictionary – S-32, Edition 5; 1433).

2) **Deviation dolphin**

   IHO Definition: A post or group of posts, which a vessel may swing around for compass adjustment.

3) **Bollard**

   IHO Definition: Small shaped post, mounted on a wharf or dolphin used to secure ship's lines.

4) **Tie-up wall**

   IHO Definition: A tie-up wall is a section of wall designated for tying-up vessels awaiting transit. Bollards and mooring devices are available for both large and small ships.

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. (IHO Dictionary – S-32, Edition 5; 3840).

6) **Chain/wire/cable**

   IHO Definition: A connection between two independent objects e.g. a buoy and pile or between two buoys used as a mooring facility.

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, Edition 5; 575).

INT 1 Reference: F 20, 21, 22; G 181; Q 40-43

8.13.1 Mooring / warping facilities (see S-4 – B-327)

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

Geo feature: Mooring / warping facility (**MORFAC**)

Attributes: BOYSHP - used only if CATMOR = *7*

CATMOR	COLOUR	COLPAT	CONDTN	CONRAD	CONVIS
DATEND	DATSTA	HEIGHT	NATCON	NOBJNM	OBJNAM
PEREND	PERSTA	STATUS	VERLEN	WATLEV	INFORM
NINFOM	NTXTDS	PICREP	SCAMIN	TXTDSC	RECDAT
RECIND	SORDAT	SORIND			

Remarks:

- If it is required to encode a pile or post that is used as a mooring post, it must be done using **MORFAC**, with attribute CATMOR = *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 **OBSTRN**, with attribute CATOBS = *1* (snag/stump). If such stumps are not dangerous to navigation, they must be encoded using **MORFAC**, with attributes CATMOR = *5* (pile or post) and CONDTN = *2* (ruined).
- A **MORFAC** feature of type area, with attribute WATLEV = *1*, *2* or *6* must also be covered by a **LNDARE** feature.

Distinction: Buoy, special purpose/general.

8.14 Dry dock

IHO Definition: **DRY DOCK**. An artificial basin fitted with a gate or caisson, into which vessels can be floated and the water pumped out to expose the vessel's bottom. Also called graving dock. (IHO Dictionary – S-32, Edition 5; 1426).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World  Dry Dock *Photograph, courtesy of the Pacific Hydrographic Branch* *Paper Chart Symbol*	**DRYDOC** (A)	CONDTN (O) Condition	1 : under construction 2 : ruined 3 : under reclamation ~~4 : wingless~~ 5 : planned construction	E
		DRVAL1 (O) Depth range value 1	Unit: Defined in the DUNI subfield of the DSPM record or the DUNITS attribute of the M_UNIT meta feature: metre Resolution: 0·1m Format: sxxxxx.x s: sign, negative values only Example: **50** for a minimum depth of 50 metres	F
ECDIS Symbol		STATUS (O) 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~~	L

Comment [j112]: S-57 Extension 06/01.

INT 1 Reference: F 25

8.14.1 Dry docks (see S-4 – B-326.1)

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

Geo feature: Dry dock (**DRYDOC**)
Attributes: CONDTN
DRVAL1 - minimum depth in the dock when the gate is open.
HORACC - applies to HORCLR
HORCLR HORLEN HORWID NOBJNM OBJNAM QUASOU
SOUACC STATUS
INFORM - maximum draft permitted in the dock (e.g. *Maximum draft permitted = 6 metres*)

NINFOM	NTXTDS	SCAMIN	TXTDSC	RECDAT	RECIND
SORDAT	SORIND				

Remarks:

- A dry dock must also be covered by a **LNDARE** feature. The boundary of a dry dock must not be encoded as a separate feature (**COALNE** or **SLCONS**), except for the gate feature (**GATCON**), which may be encoded.

Distinction: Floating dock; gate; dock area; shoreline construction.

8.15 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, Edition 5; 1427).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World  Floating Dock *Photograph, courtesy of the Pacific Hydrographic Branch* *Paper Chart Symbol* *ECDIS Symbol*	**FLODOC** (L, A)	COLOUR (O) 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	L
		COLPAT (m) Colour pattern	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	E
		CONDTN (O) Condition	1 : under construction 2 : ruined ~~3 : under reclamation~~ ~~4 : wingless~~ 5 : planned construction	E
		CONRAD (O) Conspicuous, radar	1 : radar conspicuous ~~2 : not radar conspicuous~~ 3 : radar conspicuous (has radar reflector)	E
		CONVIS (O) Conspicuous, visually	1: visually conspicuous ~~2: not visually conspicuous~~	E
		STATUS (O) 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~~	L

			14 : public ~~15 : synchronized~~ ~~16 : watched~~ ~~17 : un-watched~~ ~~18 : existence doubtful~~ ~~19 : buoyed~~	

Comment [j113]: S-57 Extension 06/01.

INT 1 Reference: F 26

8.15.1 Floating docks (see S-4 – B-326.2)

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

Geo feature: Floating dock (**FLODOC**)

Attributes: COLOUR COLPAT CONDTN CONRAD CONVIS DATEND
DATSTA DRVAL1
HORACC - applies only to HORCLR
HORCLR HORLEN HORWID LIFCAP NOBJNM OBJNAM
STATUS VERLEN
INFORM - maximum draft permitted in the dock (e.g. Maximum draft permitted = 6 metres)
NINFOM NTXTDS PICREP SCAMIN TXTDSC RECDAT
RECIND SORDAT SORIND

Remarks:

- A **CTNARE** feature may be used to warn mariners that the presence of a floating dock is temporary or periodic, through population of the attributes DATEND and DATSTA. Encoders should note that **CTNARE** may be used for DATEND and DATSTA.
- **FLODOC** of type area are part of Group 1.

Comment [j114]: ENC Encoding Bulletin No. ??

Distinction: Dry dock; dock area.

8.16 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, Edition 5; 3947).

Comment [j115]: MD8 – 4.Co.7 and 4.Cl.5

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World  Pontoon *Photograph, courtesy of the Pacific Hydrographic Branch* *Paper Chart Symbol* *ECDIS Symbol*	**PONTON** (L, A)	CONDTN (O) Condition	1 : under construction 2 : ruined ~~3 : under reclamation~~ ~~4 : wingless~~ 5 : planned construction	E
		CONRAD (O) Conspicuous, radar	1 : radar conspicuous ~~2 : not radar conspicuous~~ 3 : radar conspicuous (has radar reflector)	E
		CONVIS (O) Conspicuous, visually	1: visually conspicuous ~~2: not visually conspicuous~~	E
		FUNCTN (O) Function	~~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~~	L

Comment [j116]: MD8 – 7.Co.7

			~~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~~	
		NATCON (O) Nature of construction	~~1 : masonry~~ 2 : concreted ~~3 : loose boulders~~ 4 : hard surfaced ~~5 : unsurfaced~~ 6 : wooden 7 : metal ~~8 : glass reinforced plastic (GRP)~~ 9 : painted	L
		STATUS (O) 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~~	L

Comment [j117]: S-57 Extension 06/01.

INT 1 Reference: F 16

8.16.1 Pontoons (see S-4 – B-326.9)

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

Geo feature: Pontoon (**PONTON**)

Attributes:						
	CONDTN	CONRAD	CONVIS	DATEND	DATSTA	FUNCTN
	NATCON	NOBJNM	OBJNAM	PEREND	PERSTA	STATUS
	VERLEN	INFORM	NINFOM	NTXTDS	SCAMIN	TXTDSC
	RECDAT	RECIND	SORDAT	SORIND		

Remarks:

- A **CTNARE** feature may be used to warn mariners that the presence of a pontoon is temporary or periodic, through population of the attributes DATEND, DATSTA or PEREND, PERSTA. Encoders should note that **CTNARE** may be used for DATEND, DATSTA or PEREND, PERSTA.
- **PONTON** objects of type area are part of Group 1.

Comment [j118]: ENC Encoding Bulletin No. 11

Distinction: Bridge; mooring/warping facility; shoreline construction.

8.17 Dock area

IHO Definition: **DOCK AREA**. A dock is an artificially enclosed area within which ships may moor and which may have gates to regulate water level. (Adapted from IHO Chart Specifications, S-4).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World	**DOCARE** (A)	CATDOC (O) Category of dock	1: tidal 2: non-tidal (wet dock)	E
Paper Chart Symbol		CONDTN (O) Condition	1 : under construction 2 : ruined 3 : under reclamation ~~4 : wingless~~ 5 : planned construction	E
ECDIS Symbol		STATUS (O) 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~~	L

Comment [j119]: S-57 Extension 06/01.

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.

2) **Deviation dolphin**

   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, Edition 5; 1429).

INT 1 Reference: F 27, 28

8.17.1 Tidal and non-tidal basins (see S-4 – B-326.3 and B-326.4)

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

Geo feature: Dock area, (**DOCARE**)
Attributes: CATDOC CONDTN DATEND DATSTA
HORACC - applies only to HORCLR
HORCLR - size of the entrance
NOBJNM OBJNAM STATUS INFORM NINFOM NTXTDS
SCAMIN TXTDSC RECDAT RECIND SORDAT SORIND

Remarks:

- If the dock is navigable at the optimum display scale of the ENC data, it must be encoded using the features **DEPARE** or **DRGARE** (see clause X.X), and the geo features making up the dock limits must be encoded using appropriate features such as **COALNE, SLCONS** or **GATCON**. The dock must not be encoded as **DOCARE**. If it is required to encode the name of the dock, it must e done using the feature **SEAARE**.
- If it is required to encode a dock which is not navigable at the optimum display scale of the ENC data, it must be done using the feature **DOCARE**, covered by a **LNDARE** or **UNSARE** feature. The name of the dock should be encoded using the attribute OBJNAM on the **DOCARE**. The boundary of a dock must not be encoded as a separate feature (e.g. **COALNE, SLCONS**), except for the gate feature (**GATCON**), which may be encoded.
- 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 optimum display scale of the ENC data, the value of this datum must be encoded using the meta feature **M_SDAT**, with attribute VERDAT = *24* (local datum).
- In reality, smaller dock areas may be included in major dock areas, with different names or characteristics. To encode this fact, dock areas (**DOCARE**) and/or sea areas (**SEAARE**) may overlap.

Distinction: Harbour area (administrative; cargo transhipment area; berth; harbour facility; gate; floating dock; dry dock.

8.18 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. (Adapted from IHO Dictionary – S-32, Edition 5; 649).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol*	**GRIDRN** (~~P~~, A)	NATCON (O) Nature of construction	~~1 : masonry~~ 2 : concreted ~~3 : loose boulders~~ 4 : hard surfaced ~~5 : unsurfaced~~ 6 : wooden 7 : metal ~~8 : glass reinforced plastic (GRP)~~ ~~9 : painted~~	L
ECDIS Symbol		STATUS (O) 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~~	L
		WATLEV (O) Water level effect	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~~	E

Comment [j120]: Should not be allowed for S-101 ENCs – does not display in ECDIS. Refer ENC EB 29.

Comment [j121]: S-57 Extension 06/01.

INT 1 Reference: F 24

8.18.1 Gridirons (see S-4- B-326.8)

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

Geo feature: Gridiron, (**GRIDRN**)

Attributes: HORLEN HORWID NATCON NOBJNM OBJNAM STATUS
VERLEN WATLEV INFORM NINFOM NTXTDS SCAMIN

	TXTDSC	RECDAT	RECIND	SORDAT	SORIND

Remarks:

Distinction: Dry dock; floating dock.

8.19 Locks

IHO Definition: **LOCK BASIN**. A lock basin is a wet dock in a waterway, permitting a ship to pass from one level to another. (Adapted from IHO Dictionary – S-32, Edition 5; 2881).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**LOKBSN** (A)	STATUS (O) 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~~	L

Comment [j122]: S-57 Extension 06/01.

INT 1 Reference: F 41.1

8.19.1 Locks

If it is required to encode a lock basin, it must be done using the feature **LOKBSN**.

Geo feature: Lock basin (**LOKBSN**)
Attributes: DATEND DATSTA
HORACC - applies only to HORCLR
HORCLR HORLEN HORWID NOBJNM OBJNAM STATUS
INFORM NINFOM NTXTDS SCAMIN TXTDSC RECDAT
RECIND SORDAT SORIND

Remarks:

- If the lock is navigable at the optimum display scale of the ENC data, it must be encoded using the features **DEPARE** or **DRGARE** (see clause X.X), and the geo features making up the limits of the lock must be encoded using appropriate features such as **COALNE**, **SLCONS** or **GATCON**. The lock must not be encoded as **LOKBSN**. If it is required to encode the name of the lock, it must be done using the feature **SEAARE**.
- It if is required to encode a lock that is not navigable at the optimum display scale of the ENC data, it must be done using **LOKBSN** covered by a **LNDARE** or **UNSARE** feature. The name of the lock should be encoded using the attribute OBJNAM on the **LOKBSN** feature.
- The gates should be encoded as a **GATCON** feature with attribute CATGAT = *4* (lock gate) or *3* (caisson). At small scale, a lock may be encoded using **GATCON** only, without using **LOKBSN**.

Distinction: Gate.

9 Topographic Terms

9.1 Sea area/named water area

IHO Definition: **SEA AREA/NAMED WATER AREA**. A geographically defined part of the sea or other navigable waters. It may be specified within its limits by its proper name. (S-57, Appendix A – Chapter 1, Edition 3.1, Page 1.151, November 2000).				
Graphic	**S-101 Geo Feature**	**S-101 Attribute**	**Allowable Encoding Value**	**Attrib. Type**
Real World *Paper Chart Symbol* *ECDIS Symbol*	**SEAARE** (P, A)	CATSEA (m) Category of sea area	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	E

			48 : slope 49 : terrace 50 : valley 51 : canal 52 : lake 53 : river 54 : reach	
		OBJNAM (m) Object name		S
		STATUS (O) 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	L

Comment [j123]: S-57 Extension 06/01.

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, Edition 5; ???).

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, Edition 5; ???).

5) **Bay**

IHO Definition: An indentation in the coastline.

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) **Flat**

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.

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, Edition 5; ???).

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, Edition 5; ???).

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, Edition 5; ???).

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, Edition 5; ??? 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 orcuate 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 used for navigation.

52) **Lake**

IHO Definition: A large body of water entirely surrounded by land. (IHO Dictionary – S-32, Edition 5; 2629).

53) **River**

IHO Definition: A relatively large natural stream of water.

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, Edition 5; 4239).

Object name: IHO Definition: The individual name of an object.

INT 1 Reference: NOT SPECIFIED

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 features 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 **SEAARE**.

Geo feature:	Sea area (**SEAARE**)					
Attributes:	CATSEA	NOBJNM	OBJNAM	INFORM	NINFOM	NTXTDS
	SCAMIN	TXTDSC	RECDAT	RECIND	SORDAT	SORIND

Remarks:

- This feature has a use similar to that of the feature **LNDRGN** (see clause X.X), but for the sea.
- A **SEAARE** feature of type area should be bounded, if possible, by existing lines used by other features (e.g. **DEPCNT**, **COALNE**). If necessary, however, this area may be bounded by other lines created to close the area, or to describe a new area.
- For seas, oceans, gulfs and other types of sea area, where there is no specific value for the attribute CATSEA, the generic term 'Sea', 'Ocean', 'Gulf', etc may be included in the attributes OBJNAM and NOBJNM.
- **SEAARE** features of type area may overlap.
- A **SEAARE** feature of type area must be covered by features from Group 1 (**DEPARE**, **DRGARE**, **UNSARE** etc).

Distinction: Depth area; seabed area.

10 Tides, Currents

See S-4 – B-406

The inclusion of tidal information in ENC data sets is optional.

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

For Secondary Ports, the appropriate HO 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 HO for advice regarding the best methods of prediction for the Secondary Ports in its area of responsibility.

It is recommended that each appropriate HO, 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. The HOs 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.

10.1 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, Edition 5; 1169).

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

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World	**TS_FEB** (P, A)	CAT_TS (M) Category of tidal stream	1 : flood stream 2 : ebb stream 3 : other tidal flow	E
Paper Chart Symbol		CURVEL (M) Current velocity	Unit: Knot (kt) Resolution: 0·1 kt. Format: xx.x Example: **1.6** for a velocity of 1.6 knots	F
ECDIS Symbol		ORIENT (M) Orientation	Unit: Degree (°) – minimum value 0; maximum value 360 Resolution: 0·01° Format: xxx.xX Example: **246.7** for an orientation of 246·7 degrees	F

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, Edition 5; ??????).

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. (Adapted from IHO Dictionary – S-32, Edition 5; ??????).

3) **Other tidal flow**

   IHO Definition: Any other horizontal movement of water associated with tides, e.g. rotary flow.

Current velocity: IHO Definition: The rate of travel of a current in knots.

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).

INT 1 Reference: H 40, 41

10.1.1 Tidal stream (flood/ebb)

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 **TS_FEB**.

Geo feature: Tidal stream-flood/ebb (**TS_FEB**)

Attributes:	CAT_TS					
	CURVEL -	maximum rate (during springs)				
	DATEND	DATSTA	NOBJNM	OBJNAM	ORIENT	PEREND
	PERSTA	INFORM	NINFOM	NTXTDS	SCAMIN	TXTDSC
	RECDAT	RECIND	SORDAT	SORIND		

Remarks:

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

10.2 Current – non-gravitational

IHO Definition: **CURRENT – NON-GRAVITATIONAL**. 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, Appendix A – Chapter 1, Edition 3.1, Page 1.45, November 2000).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**CURENT** (P)	CURVEL (M) Current velocity	Unit: Knot (kt) Resolution: 0·1 kt. Format: xx.x Example: **1.6** for a velocity of 1.6 knots	F
		ORIENT (M) Orientation	Unit: Degree (°) – minimum value 0; maximum value 360 Resolution: 0·01° Format: xxx.xx Example: **246.7** for an orientation of 246·7 degrees	F

Current velocity: IHO Definition: The rate of travel of a current in knots.

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).

INT 1 Reference: H 42-43

10.2.1 Current data

If it is required to encode a non-gravitational current, it must be done using the feature **CURENT**.

Geo feature: Current (**CURENT**)

Attributes:

CURVEL	DATEND	DATSTA	NOBJNM	OBJNAM	ORIENT
PEREND	PERSTA	INFORM	NINFOM	SCAMIN	RECDAT
RECIND	SORDAT	SORIND			

Remarks:

Distinction: Tidal stream (flood/ebb); tidal stream - harmonic prediction; tidal stream - non harmonic prediction; tidal stream panel data; tidal stream - time series.

10.3 Water turbulence

IHO Definition: **WATER TURBULENCE**. The disturbance of water caused by the interaction of any combination of waves, currents, tidal streams, wind, shoal patches and obstructions. (S-57, Appendix A – Chapter 1, Edition 3.1, Page 1.198, November 2000).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**WATTUR** (P, L, A)	CATWAT (M) Category of water turbulence	1 : breakers 2 : eddies 3 : overfalls 4 : tide rips 5 : bombora	E

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, Edition 5; 540).

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, Edition 5; 1560).

3) **Overfalls**

   IHO Definition: Short, breaking waves occurring when a strong current passes over a shoal or other submarine obstruction ormeets a contrary current or wind. (IHO Dictionary – S-32, Edition 5; 3631).

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, Edition 5; 5494).

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).

INT 1 Reference: H 44, 45; K 17

10.3.1 Overfalls, races, breakers, eddies (see S-4 – B-423)

If it is required to encode a disturbance of water, it must be done using the feature **WATTUR**.

Geo feature:	Water turbulence (**WATTUR**)					
Attributes:	CATWAT	OBJNAM	NOBJNM	INFORM	NINFOM	NTXTDS
	SCAMIN	TXTDSC	RECDAT	RECIND	SORDAT	SORIND

Remarks:

- If it is required to encode a breaker over an off-lying shoal, it must be done using a **WATTUR** feature at the same position as the feature causing the breaker.
- A **WATTUR** feature of type area must be covered by **DEPARE** or **UNSARE** features as appropriate.

Distinction:

10.4 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, Edition 5; 1169).

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

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**TS_PRH** (P, A)	STATUS (O) 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~~	L
		T_MTOD (M) Tide – method of tidal prediction	1 : simplified harmonic method of tidal prediction 2 : full harmonic method of tidal prediction ~~3 : time and height difference non-harmonic method~~	E
		T_VAHC (M) Tide – value of harmonic constituents	See below for description and example of formatted string value	A

Comment [j124]: S-57 Extension 06/01.

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.

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.

Remarks:

- The attribute "Tide - method of tidal prediction" encodes the various methods of tidal prediction.

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.

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 (ie 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.

INT 1 Reference: H 40-41

10.4.1 Prediction by harmonic methods

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

Geo feature: Tidal stream – harmonic prediction (**TS_PRH**)
Attribute: NOBJNM OBJNAM T_MTOD T_VAHC STATUS INFORM NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND SORDAT SORIND

Remarks:

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

10.5 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, Edition 5; 1169).

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, Appendix A – Chapter 1, Edition 3.1, Page 1.175, November 2000).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**TS_PNH** (P, A)	STATUS (O) 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~~	L
		T_MTOD (M) Tide – method of tidal prediction	~~1 : simplified harmonic method of tidal prediction~~ ~~2 : full harmonic method of tidal prediction~~ 3 : time and height difference non-harmonic method	E
		T_THDF (M) Tide – time and height differences	See below for description and example of formatted string value	A

Comment [j125]: S-57 Extension 06/01.

Tide – method of tidal prediction: IHO Definition:

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.

Remarks:

- The attribute "Tide - method of tidal prediction" encodes the various methods of tidal prediction.

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 object.
- 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.

INT 1 Reference: H 40-41

10.5.1 Prediction by non-harmonic methods

If it is required to encode parameters for the prediction of tidal streams using time and rate, it must be done using the feature **TS_PNH**.

The reference station to be used for these predictions must be identified using a collection feature (**C_ASSO**) between the stream parameter feature **TS_TIS** or **TS_PRH** of the reference station, and the stream parameter feature **TS_PNH** of the secondary station. If the reference station is not located within the data set or exchange set, then its tidal stream parameters should be supplied a geo feature with no geometry.

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

Geo feature: Tidal stream – non-harmonic prediction (**TS_PNH**)

Attribute:						
	NOBJNM	OBJNAM	T_MTOD	T_THDF	STATUS	INFORM
	NINFOM	NTXTDS	SCAMIN	TXTDSC	RECDAT	RECIND
	SORDAT	SORIND				

Remarks:

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

10.6 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, Edition 5; 1169).

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

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**TS_PAD** (P, A)	TS_TSP (M) Tidal stream – panel values	See below for description and example of formatted string value	A

Tide 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,124,2.2,128,2.1,125,2.9,116,2.8,110,2.0,095,0.6,020,0.2,320,1.9,315,2.1,300,2.8,268,2.6,200,2.4,165,2.5

Remarks:

- The attribute "Tidal stream - panel values" encodes the identification of the reference station with reference water level and the direction of the flow and the springs rate from 6 hours before to 6 hours after high water (HW) or low water (LW) at the reference station, at hourly intervals.
- The relationship to a reference station is encoded using a collection object.

INT 1 Reference: H 40-41

10.6.1 Tidal stream panels

If it is required to encode the information generally shown on paper charts as a tidal stream panel and stations, it must be done using the feature **TS_PAD**.

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.

Geo feature: Tidal stream panel data (**TS_PAD**)

Attribute: NOBJNM OBJNAM TS_TSP INFORM NINFOM NTXTDS
SCAMIN TXTDSC RECDAT RECIND SORDAT SORIND

Remarks:

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

10.7 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, Edition 5; 1169).

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, Appendix A – Chapter 1, Edition 3.1, Page 1.177, November 2000).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**TS_TIS** (P, A)	STATUS (O) 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~~	L
		TIMEND (M) Time end	See below for description and example of formatted string value	A
		TIMSTA (M) Time start	See below for description and example of formatted string value	A
		T_TINT (M) Tide, current – time interval of values	Unit: Minute Resolution: 1 minute. Format: xxx Example: **60** for a time interval of 60 minutes	I
		TS_TSV (M) Tidal stream, current – time series values	See below for description and example of formatted string value	A

Comment [j126]: S-57 Extension 06/01.

Comment [j127]: MD8 – 2.Co.7 and 2.Cl.9

Comment [j128]: MD8 – 2.Co.7 and 2.Cl.9

Time end: IHO Definition:

Indication: The "time end" must consist of a date and a time separated by a capital "T". The date 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). The time should 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: CCYYMMDD**T**hhmmss **(mandatory)**

Example: 19940426T094500 for a period ending at 09:45 am on 26 April 1994.

Remarks:
- The attribute "time end" indicates the end of a active period.

Time start: IHO Definition:

Indication: The "time start" will consist of a date and a time separated by a capital "T". The date 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). The time should 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: CCYYMMDD**T**hhmmss **(mandatory)**

Example: 19940212T162000 for a period starting at 04:20 pm on 12 February 1994.

Remarks:
- The attribute "time start" indicates the start of a active period.

Time, current – time interval of values: IHO Definition:

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.

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.

INT 1 Reference: H 40-41

10.7.1 Tidal stream time series

If it is required to encode time series data for tidal streams, it must be done using the feature **TS_TIS**.

Geo feature: Tidal stream - time series (**TS_TIS**)

Attribute:	NOBJNM	OBJNAM				
	TIMEND	TIMSTA	- specify the period for which the time series is valid			
	TS_TSV	T_TINT	STATUS	INFORM	NINFOM	NTXTDS
	SCAMIN	TXTDSC	RECDAT	RECIND	SORDAT	SORIND

Remarks:

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

10.8 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. (Adopted from IHO Dictionary – S-32, Edition 5; 5429).

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

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**T_HMON** (P, A)	STATUS (O) 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~~	L
		T_ACWL (O) Tide – accuracy of water level	1 : better than 0.1 m and 10 minutes 2 : worse than 0.1 m and 10 minutes	E
		T_MTOD (M) Tide – method of tidal prediction	1 : simplified harmonic method of tidal prediction 2 : full harmonic method of tidal prediction ~~3 : time and height difference non-harmonic method~~	E
		T_VAHC (M) Tide – value of harmonic constituents	See below for description and example of formatted string value	A

Comment [j129]: S-57 Extension 06/01

Tide – accuracy of water level: IHO Definition:

Remarks:

- The attribute "Tide - accuracy of water level" encodes the accuracy of the water level, to the confidence level of 95%.

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.

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.

Remarks:
- The attribute "Tide - method of tidal prediction" encodes the various methods of tidal prediction.

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.

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 (ie 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.

INT 1 Reference: NOT SPECIFIED

10.8.1 Prediction by harmonic methods

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

Geo feature: Tide – harmonic prediction (**T_HMON**)

Attribute:						
	NOBJNM	OBJNAM	T_ACWL	T_MTOD	T_VAHC	STATUS
	INFORM	NINFOM	NTXTDS	SCAMIN	TXTDSC	RECDAT
	RECIND	SORDAT	SORIND			

Remarks:

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

10.9 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. (Adopted from IHO Dictionary – S-32, Edition 5; 5429).

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

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**T_NHMN** (P, A)	STATUS (O) 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~~	L
		T_ACWL (O) Tide – accuracy of water level	1 : better than 0.1 m and 10 minutes 2 : worse than 0.1 m and 10 minutes	E
		T_MTOD (M) Tide – method of tidal prediction	~~1 : simplified harmonic method of tidal prediction~~ ~~2 : full harmonic method of tidal prediction~~ 3 : time and height difference non-harmonic method	E
		T_THDF (M) Tide – time and height differences	See below for description and example of formatted string value	A

Comment [j130]: S-57 Extension 06/01.

Tide – accuracy of water level: IHO Definition:

Remarks:

- The attribute "Tide - accuracy of water level" encodes the accuracy of the water level, to the confidence level of 95%.

Tide – method of tidal prediction: IHO Definition:

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.

Remarks:

- The attribute "Tide - method of tidal prediction" encodes the various methods of tidal prediction.

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 object.
- 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.

INT 1 Reference:

10.9.1 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 **T_NHMN**.

The reference port to be used for these predictions must be identified using a collection feature (**C_ASSO**) between the tidal parameter feature **T_TIMS** or **T_HMON** of the reference port, and the tidal parameter feature **T_NHMN** of the secondary port. If the reference port is not located within the data set 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.

Geo feature: Tide – non-harmonic prediction (**TS_NHMN**)

Attribute:	NOBJNM	OBJNAM	T_ACWL	T_MTOD	T_THDF	STATUS
	INFORM	NINFOM	NTXTDS	SCAMIN	TXTDSC	RECDAT
	RECIND	SORDAT	SORIND			

Remarks:

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

10.10 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. (Adopted from IHO Dictionary – S-32, Edition 5; 5429).

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, Appendix A – Chapter 1, Edition 3.1, Page 1.180, November 2000).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**T_TIMS** (P, A)	STATUS (O) 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~~	L
		TIMEND (M) Time end	See below for description and example of formatted string value	A
		TIMSTA (M) Time start	See below for description and example of formatted string value	A
		T_ACWL (O) Tide – accuracy of water level	1 : better than 0.1 m and 10 minutes 2 : worse than 0.1 m and 10 minutes	E
		T_HWLW (M) Tide – high and low water values	See below for description and example of formatted string value	A
		T_TINT (O) Tide, current – time interval of values	Unit: Minute Resolution: 1 minute. Format: xxx Example: **60** for a time interval of 60 minutes	I

Comment [j131]: S-57 Extension 06/01.

Comment [j132]: MD8 – 2.Co.7 and 2.Cl.9

Comment [j133]: MD8 – 2.Co.7 and 2.Cl.9

		T_TSVL (O) Tide – time series values	See below for description and example of formatted string value	A

Time end: IHO Definition:

Indication: The "time end" must consist of a date and a time separated by a capital "T". The date 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). The time should 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: CCYYMMDD**T**hhmmss **(mandatory)**

Example: 19940426T094500 for a period ending at 09:45 am on 26 April 1994.

Remarks:
- The attribute "time end" indicates the end of a active period.

Time start: IHO Definition:

Indication: Dates/times and heights are to be encoded in pairs, each value separated by a comma.

The date/time 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), separated by a capital "T" from the hour (hh) and minutes (mm) which should each be encoded using 2 digits. This conforms to ISO 8601: 1988. Seconds should not be used.

The height should be given in metres (xx.x) with a resolution of 0.1 metre.

Format: CCYYMMDDThhmm,xx.x,CCYYMMDDThhmm,xx.x

Example: 19950428T1020,1.2,19950428T1455,4.8,...

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.

Tide – accuracy of water level: IHO Definition:

Remarks:
- The attribute "Tide - accuracy of water level" encodes the accuracy of the water level, to the confidence level of 95%.

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 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), separated by a capital "T" from the hour (hh) and minutes (mm) which should each be encoded using 2 digits. This conforms to ISO 8601: 1988. Seconds should not be used.

The height should be given in metres (xx.x) with a resolution of 0.1 metre.

Format: CCYYMMDD**T**hhmm,xx.x,CCYYMMDDThhmm,xx.x

Example: 19950428T1020,1.2,19950428T1455,4.8,...

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.

Time, current – time interval of values: IHO Definition:

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.

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.

INT 1 Reference:

10.10.1 Time series data

If it is required to encode times and heights of high and low waters, it must be done using the feature **T_TIMS**. In addition, where the data is available, a regular time series of tidal heights should also be encoded using this feature.

Geo feature: Tide – time series (**T_TIMS**)

Attribute:

NOBJNM	OBJNAM				
TIMEND	TIMSTA	- specify the period for which the time series is valid			
T_ACWL	T_TSVL	T_TINT	T_HWLW	STATUS	INFORM
NINFOM	NTXTDS	SCAMIN	TXTDSC	RECDAT	RECIND
SORDAT	SORIND				

Remarks:

Distinction: Tide – harmonic prediction; tide – non-harmonic prediction.

11 Depths

11.1 Sounding

IHO Definition: **SOUNDING**. A measured water depth or spot which has been reduced to a vertical datum (may be a drying height). (S-57, Appendix A – Chapter 1, Edition 3.1, Page 1.163, November 2000).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol*	**SOUNDG** (P)	EXPSOU (O) Exposition of sounding	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	E
ECDIS Symbol		QUASOU (O) Quality of sounding measurement	1 : depth known 2 : 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~~	L
		STATUS (O) 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~~	L
		TECSOU (O) Technique of sounding measurement	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	L

Comment [j134]: S-57 Extension 06/01.

			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	
		VERDAT (O) Vertical datum	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)~~	E

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.

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.

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.

Quality of sounding measurement: IHO Definition:

1) **Depth known**

IHO Definition: The depth from chart datum to the bottom is a known value.

2) **Depth or least depth unknown**

IHO Definition: The depth from chart datum to the bottom, or the shoalest depth of the feature is unk

Comment [j135]: MD8 – 4.Co.11

3) **Doubtful sounding**

IHO Definition: A depth that may be less than indicated. (Adapted from IHO Dictionary – S-32, Edition 5; 4840).

4) **Unreliable sounding**

IHO Definition: A depth that is considered to be an unreliable value.

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, Edition 5; 4848).

6) **Least depth known**

IHO Definition: The shoalest depth over a feature is of known value. (Adapted from IHO Dictionary – S-32, Edition 5; 2705).

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.

8) **Value reported (not surveyed)**

IHO Definition: Depth value obtained from a report, but not fully surveyed.

9) **Value reported (not confirmed)**

IHO Definition: Depth value obtained from a report, which it has not been possible to confirm.

Technique of sounding measurement: IHO Definition:

1) **Found by echo-sounder**

IHO Definition: The depth was determined 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, Edition 5; 1547).

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, Edition 5; 4710).

3) **Found by multi-beam**

IHO Definition: The depth was determined 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, Edition 5; 3339).

4) **Found by diver**

IHO Definition: The depth was determined by a person skilled in the practice of diving. (Adapted from IHO

Dictionary – S-32, Edition 5; 1422).

5) **Found by lead-line**

IHO Definition: The depth was determined by using a line, graduated with attached marks and fastened to a sounding lead. (Adapted from IHO Dictionary – S-32, Edition 5; 2698).

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, Edition 5; 6013).

7) **Found by laser**

IHO Definition: The depth was determined 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, Edition 5; 2763).

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.

9) **Found by electromagnetic sensor**

IHO Definition: The depth was determined by using an instrument that compares electromagnetic signals. (Adapted from IHO Dictionary – S-32, Edition 5; 1571).

10) **Found by levelling**

IHO Definition: The depth was determined by using levelling techniques to find the elevation of the point relative to a datum. (Adapted from IHO Dictionary – S-32, Edition 5; 2741).

11) **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, Edition 5; 4710) [415.2].

Comment [j136]: What is this?

12) **Computer generated**

IHO Definition: the sounding was determined from a bottom model constructed using a computer.

INT 1 Reference: I 10-15

11.1.1 Soundings (see S-4 – B-412)

Geo feature: Sounding (**SOUNDG**)

Attributes:

EXPSOU -	indicates objects with a "value of sounding" within or not within the range of depth of the surrounding area
NOBJNM	OBJNAM
QUASOU -	see Table below
SOUACC -	see use of the meta object **M_QUAL** (clauses X.X and X.X)
STATUS	
TECSOU -	only for lower reliability soundings
INFORM	NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND
SORDAT -	see Table below
SORIND	

A sounding associated with a rock or coral pinnacle, which is an obstruction to navigation, must be encoded using the feature **UWTROC** (INT1 K14 see clause X.X) with attribute VALSOU 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 feature, provided that all the spatial and geo feature attributes are common to the group.

As the sounding multiplication factor (SOMF) for ENC is always 10, soundings must only be encoded to one decimal place of a metre. Drying soundings must be indicated by a negative value.

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

Sounding	S-4	INT 1	QUAPOS	QUASOU	Remarks
In true position	412.1	I10		*1*	Should be encoded using QUAPOS = *10*
Out of position on paper chart	412.2	I11 I12		*1*	Spatial feature must be encoded at the true position. There is no "sounding, out of position" in an ENC.
No bottom found	412.3	I13		*5*	
Lower reliability	412.4	I14	*4*	*4*	
Drying	413	I15		*1*	Negative value
Doubtful	424.4	I2		*3*	Existence doubtful should be encoded using STATUS = *18*
Reported but not confirmed		I4	*8*	*9*	If available, the year of report must be encoded using the attribute SORDAT

Remarks:

- Encoders are advised to use caution when considering the population of EXPSOU = *2* (shoaler than the range of depth of the surrounding depth area) for **SOUNDG** objects, as **SOUNDG** objects 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. **OBSTRN**) to encode the depth.

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

11.2 Dredged area

IHO Definition: **DREDGED AREA**. An area of the bottom of a body of water which has been deepened by dredging. (IHO Dictionary – S-32, Edition 5; 1462).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**DRGARE** (A)	DRVAL1 (M) Depth range value 1	Unit: Defined in the DUNI subfield of the DSPM record or the DUNITS attribute of the M_UNIT meta feature: metre Resolution: 0·1m Format: sxxxxx.x s: sign, negative values only Example: **50** for a minimum depth of 50 metres	F
		QUASOU (O) Quality of sounding measurement	~~1 : depth known~~ ~~2 : 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	L
		RESTRN (O) Restriction	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~~	L

			~~21 : drilling restricted~~ ~~22 : removal of historical artifacts prohibited~~ ~~23 : cargo transhipment (lightering) prohibited~~ ~~24 : dragging prohibited~~ 25 : stopping prohibited ~~26 : landing prohibited~~ 27 : speed restricted 28 : swimming prohibited	
		TECSOU (O) Technique of sounding measurement	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~~	L
		VERDAT (O) Vertical datum	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	E

Comment [j137]: 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)~~	

Depth range value 1: IHO Definition: The minimum (shoalest) value of a depth range.

Remarks:

- Where the area dries, the value is negative.

Comment [j138]: S-57 App A, Ch 2 – 2.124.

Quality of sounding measurement: IHO Definition:

10) **Maintained depth**

IHO Definition: The depth at which a channel is kept by human influence, usually by dredging. (IHO Dictionary – S-32, Edition 5; 3057).

11) **Not regularly maintained**

IHO Definition: Depths may be altered by human influence, but will not be routinely maintained.

INT 1 Reference: I 20-23

11.2.1 Dredged areas (see S-4 – B-414)

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

Geo feature: Dredged area (**DRGARE**)
Attributes: DRVAL1 - depth of dredging
DRVAL2 - depth of dredging (if different to DRVAL1)
NOBJNM OBJNAM QUASOU RESTRN
SOUACC - see use of **M_QUAL** (clause X.X)
TECSOU
INFORM - date of dredging (e.g. Dredged in 1995)
NINFOM - date of dredging in national language (e.g. Dragué en 1995)
NTXTDS SCAMIN TXTDSC RECDAT RECIND SORDAT
SORIND

Remarks:

- **DRGARE** features are part of Group 1.

Distinction: Depth area; dumping ground; swept area.

11.3 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, Edition 5; 5248).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**SWPARE** (A)	DRVAL1 (M) Depth range value 1	Unit: Defined in the DUNI subfield of the DSPM record or the DUNITS attribute of the M_UNIT meta feature: metre Resolution: 0·1m Format: sxxxxx.x s: sign, negative values only Example: **50** for a minimum depth of 50 metres	F
		QUASOU (O) Quality of sounding measurement	1 : depth known ~~2 : 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~~	L
		TECSOU (O) Technique of sounding measurement	~~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~~	L
		VERDAT (O) Vertical datum	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	E

			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)~~	

Depth range value 1: IHO Definition: The minimum (shoalest) value of a depth range.

Remarks:

- Where the area dries, the value is negative.

Comment [j139]: S-57 App A, Ch 2 – 2.124.

Technique of sounding measurement: IHO Definition:

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, Edition 5; 6013).

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.

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, Edition 5; 4710) [415.2].

Comment [j140]: What is this?

INT 1 Reference: I 24

11.3.1 Swept areas (see S-4 – B-415)

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

Geo feature: Swept area (**SWPARE**)
Attributes: DRVAL1 - swept depth
QUASOU SOUACC TECSOU
INFORM - latest date of sweeping (e.g. Swept in 1998)

NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND
SORDAT SORIND

Spot soundings and depth contours shown in these areas must be encoded using **SOUNDG** and **DEPCNT** features. Attributes QUASOU, SOUACC and TECSOU encoded on **SWPARE** 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 **M_QUAL** (see clause X.X).

Even if the area contains no spot soundings or depth contours, a **SWPARE** feature must overlap **DEPARE** or **DRGARE** features. If there is insufficient depth information to allow the attributes DRVAL1 and DRVAL2 to be encoded on a **DEPARE** or **DRGARE** feature, DRVAL1 should be set to the swept depth and DRVAL2 should be set to an empty (null) value.

Remarks:

- When a swept area occupies an entire **M_QUAL** area feature and a **SWPARE** feature is not defined separately, DRVAL1 for the **M_QUAL** feature must be used to encode the swept depth. The attribute SOUACC may be used on the **M_QUAL** feature to specify the accuracy of the swept depth defined by DRVAL1 - the attribute POSACC 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 **M_QUAL** area feature and a **SWPARE** feature is defined separately, the DRVAL1 value encoded on the **M_QUAL** feature must be the same as the DRVAL1 value encoded on the **SWPARE** feature. SOUACC may be used on the **M_QUAL** feature to specify the accuracy of the swept depth - POSACC must not be used. There must be no depth or positional accuracy information provided for any underlying soundings within the swept area.
- When a **SWPARE** feature exists within a **M_QUAL** feature, SOUACC must only be used on the **M_QUAL** feature if the same depth accuracy applies to the swept depth and to the soundings outside the swept area. POSACC 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.

Distinction: Depth area; dredged area; unsurveyed area.

11.4 Unsurveyed area

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

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**UNSARE** (A)			

INT 1 Reference: I 25

11.4.1 Unsurveyed areas (see S-4 – B-417.8)

Areas with no bathymetric survey information, and falling within a meta feature **M_COVR** area with attribute CATCOV = *1* (coverage available), must be encoded using the feature **UNSARE**.

Geo feature: Unsurveyed area (**UNSARE**)
Attributes: INFORM NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND SORDAT SORIND

Remarks:
- **UNSARE** features are part of Group 1.

11.4.2 Incompletely surveyed areas

An incompletely surveyed area should be encoded using either an **UNSARE** feature, within which soundings and contours may be encoded (but not depth areas), or using **DEPARE** features. The attributes DRVAL1 and DRVAL2 for such depth areas should have explicit values.

The area must also be covered by **M_QUAL** features (see clause X.X), with suitably defined attribute CATZOC values. Further information may be given using the meta features **M_SREL**, where appropriate.

A cautionary note should also be encoded using a **CTNARE** feature of type area (see clause X.X).

Remarks:

Distinction:

11.5 Depth contour

IHO Definition: **DEPTH CONTOUR**. A line connecting points of equal water depth which is sometimes significantly displaced outside of soundings, symbols and other chart detail for clarity as well as generalization. Depth contours, therefore, often represent an approximate location of the line of equal depth as related to the surveyed line delineated on the source. Also referred to as depth curve. (IHO Dictionary – S-32, Edition 5; 1314, 1315).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**DEPCNT** (L)	VALDCO (M) Value of depth contour	Unit: Defined in the DUNI subfield of the DSPM record or the DUNITS attribute of the M_UNIT meta feature: metre Resolution: 0·1m Format: sxxxxx.x s: sign, negative values only Example: **50** for a depth contour of 50 metres	F

Value of depth contour: IHO Definition: The depth of a sea bottom contour.

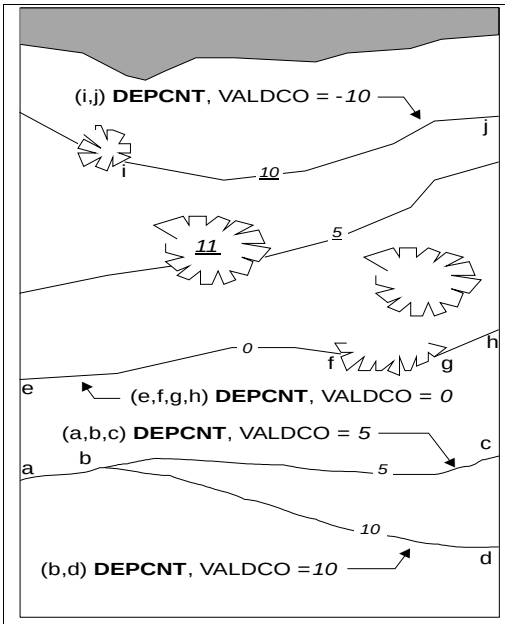
Remarks:

- Drying contours are indicated by a negative value.

INT 1 Reference: I 15, 30 ,31

11.5.1 Depth contours (see S-4 – B-411)

Geo feature: Depth contour (**DEPCNT**)
Attributes: VALDCO - value of depth contour (negative value for drying contours)
INFORM NINFOM NTXTDS SCAMIN TXTDSC RECDAT
RECIND SORDAT SORIND



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 **DEPCNT** with the attribute VALDCO = *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 cell, a coastline feature or another contour, in order to define closed areas.

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

Remarks:

Distinction: Sounding; depth area; coastline.

11.6 Depth area

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

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**DEPARE** (L, A)	DRVAL1 (M) Depth range value 1	Unit: Defined in the DUNI subfield of the DSPM record or the DUNITS attribute of the M_UNIT meta feature: metre Resolution: 0·1m Format: sxxxxx.x s: sign, negative values only Example: **50** for a minimum depth of 50 metres	F
		DRVAL2 (M) Depth range value 2	Unit: Defined in the DUNI subfield of the DSPM record or the DUNITS attribute of the M_UNIT meta feature: metre Resolution: 0·1m Format: sxxxxx.x s: sign, negative values only Example: **100** for a minimum depth of 100 metres	F
		QUASOU (O) Quality of sounding measurement	1 : depth known 2 : 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~~	L

Depth range value 1: IHO Definition: The minimum (shoalest) value of a depth range.

Remarks:

- Where the area dries, the value is negative.

Comment [j141]: S-57 App A, Ch 2 – 2.124.

Depth range value 2: IHO Definition: The maximum (deepest) value of a depth range.

Remarks:

- Where the area dries, the value is negative or zero (0).

INT 1 Reference: NOT SPECIFIED

11.6.1 Depth areas

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

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

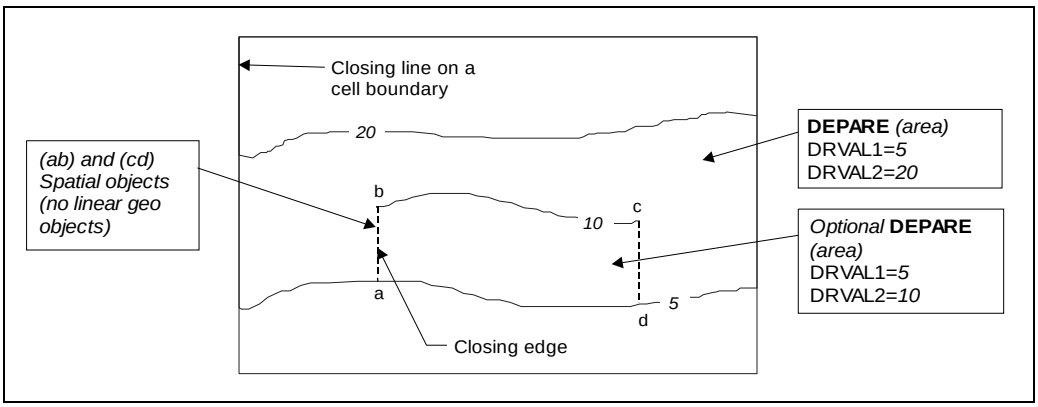
A **DEPARE** feature of type line may be created at the borders of area features **DEPARE** and **DRGARE** when the limit between the two features does not contain any **COALNE, DAMCON, DEPCNT, GATCON, LNDARE or SLCONS** features of type line.

DEPARE features of type area are part of Group 1.

Geo feature:	Depth area (**DEPARE**)					
Attributes:	DRVAL1	DRVAL2	QUASOU	INFORM	NINFOM	NTXTDS
	SCAMIN	TXTDSC	RECDAT	RECIND	SORDAT	SORIND

11.6.2 Geometry of depth areas

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



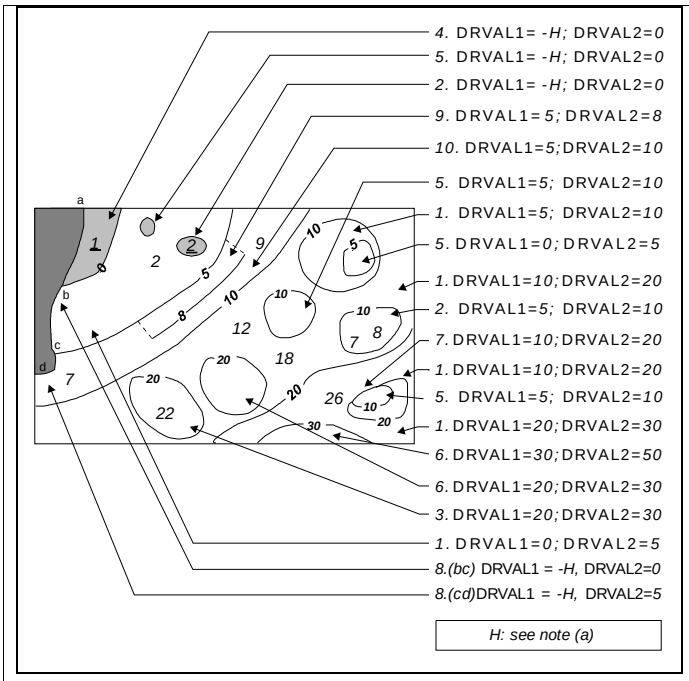
Remarks:

- For short isolated sections of **DEPCNT** features such as (bc), it is up to the producing authority whether to encode the small area (abcda) as a separate **DEPARE** feature of type area, or to encode only the line (bc) as a floating **DEPCNT** feature.

11.6.3 Use of attributes DRVAL1 and DRVAL2 for depth areas in general

For each depth area of type area, DRVAL1 and DRVAL2 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 data set.

A drying area, within which a drying height is indicated without a true position, should be encoded using a **DEPARE** feature, with DRVAL1 usually set to -H and DRVAL2 set to a data set contour value (usually zero). The drying height should be encoded using the attribute INFORM on the **DEPARE** feature (e.g. *Dries 1.4*).



(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; (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 cover the most common encoding scenarios; other encoding scenarios are possible.

1. If the depth area is bounded by two or more depth contours:
   DRVAL1 should take the value of the data set depth contour immediately shallower than the value of DRVAL2.
   DRVAL2 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):
   DRVAL1 should take the value of the data set depth contour immediately shallower than the value of the sounding or -H.
   DRVAL2 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):
   DRVAL1 should take the value of the depth contour.
   DRVAL2 should take the value of the data set depth contour immediately deeper than or equal to the value of the sounding.

4. If the shallowest depth is defined by the coastline:
   DRVAL1 should take the value of -H.
   DRVAL2 should take the value of the shallowest data set depth contour bounding the area.

5. If the depth area is bounded by only one depth contour, contains no soundings, and is a shoal:
   DRVAL1 should take the value of the data set depth contour immediately shallower than the value of the depth contour, or -H.
   DRVAL2 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:
   DRVAL1 should take the value of the depth contour.
   DRVAL2 should take the value of the data set depth contour immediately deeper than the value of the

depth contour.

9. 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:
   If encoded, DRVAL1 should take the value of the shallowest depth contour.
   If encoded, DRVAL2 should take the value of the deepest depth contour.
   Note: The encoding of this **DEPARE** feature as a separate area is optional - see also preceding Figure.

10. If the depth area is bounded by complete depth contours, but contains an incomplete (floating) depth contour:
    DRVAL1 should take the value of the shallowest depth contour.
    DRVAL2 should take the value of the deepest depth contour.

11.6.4 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:

11.6.4.1 Areas of omitted bathymetry

Where larger scale coverage is available, the larger scale charts should be examined to determine the shallowest **DEPARE** feature within the whole of the area. One **DEPARE** feature should then be created, with attributes DRVAL1 and DRVAL2 encoded from the values obtained from the larger scale. **DEPARE** features of type line may be created to join the area of omitted bathymetry with adjoining known **DEPARE** features of type area.

Where larger scale coverage does not exist, a single **DEPARE** feature should be created to cover the area of omitted bathymetry. The DRVAL1 value of the **DEPARE** 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 DRVAL1 value for the area of omitted bathymetry should be set to 5). The DRVAL2 value should be set to the shallowest value of the surrounding Group 1 polygons. **DEPARE** features of type line may be created to join the area with adjoining known **DEPARE** objects of type area.
In either case, the areas should be covered by a **CTNARE** feature, the boundary of which follows exactly the surrounding Group 1 features (see clause X.X).

11.6.4.2 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 **CTNARE** feature should be created covering the **DEPARE** features of type area, within the area of simplified bathymetry, in order to encode a cautionary note (see clause X.X).

Remarks:

- The value of DRVAL2 for the deepest depth area (**DEPARE**) on the ENC cell should be encoded with the next deepest depth contour from the standard range of depth contours appropriate to the optimum display scale of the ENC data, noting that the depth ranges used for adjoining ENC data of the same or similar optimum display scale must also be considered.

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

12 Nature of the Seabed

12.1 Seabed area

IHO Definition: **SEABED AREA**. 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 character (or characteristics) of the bottom, or quality of the bottom. (IHO Dictionary – S-32, Edition 5; 515).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**SBDARE** (P, L, A)	COLOUR (O) 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	L
		NATQUA (m) Nature of surface – qualifying terms	1 : fine 2 : medium 3 : coarse 4 : broken 5 : sticky 6 : soft 7 : stiff 8 : volcanic 9 : calcareous 10 : hard	L
		NATSUR (m) Nature of surface	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	L
		WATLEV (O) Water level effect	1 : partly submerged at high water 2 : always dry 3 : always under water/ submerged 4 : covers and uncovers 5 : awash	E

			6 : subject to inundation or flooding ~~7 : floating~~	

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-4 – B-425.6).

2) **Medium**

   IHO Definition: Falls within the moderate size continuum for a particular nature of surface term. (S-4 – B-425.6).

3) **Coarse**

   IHO Definition: Falls within the largest size continuum for a particular nature of surface term. (S-4 – B-425.6).

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, Edition 5; 603).

10) **Hard**

   IHO Definition: Firm; usually refers to an area of the sea floor not covered by unconsolidated sediment. (IHO Dictionary – S-32, Edition 5; 2194 and adapted from Webster's II New Riverside Dictionary, 1984).

Nature of surface: IHO Definition:

1) **Mud**

   IHO Definition: Soft, wet earth.

2) **Clay**

   IHO Definition: (Particles of less than 0.002mm); stiff, sticky earth that becomes hard when baked.

3) **Silt**

   IHO Definition: (Particles of 0.002-0.0625mm); when dried on hand will rub off easily.

4) **Sand**

IHO Definition: (Particles of 0.0625-2.0mm); tiny grains of crushed or worn rock.

5) **Stone**

IHO Definition: A general term for rock fragments ranging in size from pebbles and gravel to boulders or a large rock mass. (IHO Dictionary – S-32, Edition 5; 5059).

6) **Gravel**

IHO Definition: (Particles of 2.0-4.0mm); small stones with coarse sand.

7) **Pebbles**

IHO Definition: (Particles of 4.0-64.0mm); small stones made smooth and round by being rolled in water.

8) **Cobbles**

IHO Definition: (Particles of 64.0-256.0mm); stones worn round and smooth by water and used for paving.

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, Edition 5; 4415).

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, Edition 5; 2680).

14) **Coral**

IHO Definition: Hard calcareous skeletons of many tribes of marine polyps. (IHO Dictionary – S-32, Edition 5; 1061).

17) **Shells**

IHO Definition: Exoskeletons of various water dwelling animals. (Adapted from IHO Dictionary – S-32, Edition 5; 4680).

18) **Boulder**

IHO Definition: A rounded rock with diameter of 256 mm or larger. (Adapted from IHO Dictionary – S-32, Edition 5; 527).

Remarks:

- Mud, sand, stone, rock are terms used for the general description. Clay, silt, gravel, pebbles, cobbles are more specific terms related to particle size.

INT 1 Reference: J 1-11, 30-39; K16

12.1.1 Description of the bottom (see S-4 – B-425)

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 feature **SBDARE**.

Geo feature:	Seabed area (**SBDARE**)					
Attributes:	COLOUR	NATQUA	NATSUR	WATLEV	NOBJNM	OBJNAM
	INFORM	NINFOM	NTXTDS	SCAMIN	TXTDSC	RECDAT
	RECIND	SORDAT	SORIND			

Remarks:

- 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.
- In the following clauses, the paragraph prefixes refer to the examples shown in the Figure below.

(a) Mixed natures: The dominant nature of the seabed should be given first. When there are qualifying terms associated with the various natures of surface, the qualifying terms must be listed in the same order as the nature of surface list. Where a particular nature of surface has no qualifying term, the place in the list must be left empty and a delimiting comma must be encoded. For example, to encode a bottom quality such as fine sand, mud, and broken shells, the attributes NATSUR = *4,1,17* and NATQUA = *1,,4* must be encoded as shown. Where the last nature of surface in a list has no qualifying term, a trailing comma must be encoded. For example, "fine sand and mud" must be encoded with NATSUR = *4,1* and NATQUA = *1,*.

(b) Underlying material: Should be encoded in the same way as mixed natures, replacing the comma by a slash (/). The surface layer must be given first, followed by the underlying layers.

(c) Coral reef, which is always covered, represented as an area (INT1 – K16): An **OBSTRN** feature of type area must be encoded with attributes CATOBS = *6* (foul area) and NATSUR = *14* (coral). This feature must be covered by a **DEPARE** or **UNSARE** feature as appropriate. In this area, some point dangers may be shown. An **UWTROC** feature should be encoded for each individual point danger.

(d) Hard bottom: The attribute NATQUA = *10* (hard) should be encoded, without being associated with NATSUR.

(e) On the source, in the intertidal area or along the drying line, the nature of surface is sometimes shown by an open line rather than a closed area. In such cases, a **SBDARE** feature of type line should be encoded, with attribute WATLEV = *4* (covers and uncovers).

(f) If it is required to encode a rock pinnacle, which is dangerous to navigation, it must be done using the feature **UWTROC**, while a rocky nature of seabed should be encoded using a **SBDARE** feature of type point.

(g) Where a **SBDARE** feature of type area is located in an intertidal area, it should be encoded with WATLEV = *4* (covers and uncovers)

Distinction: Sand wave; sea area/named water area; weed/kelp.

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, 2nd Ed.). Kelp is one of an order (laminariales) of usually large, blade-shaped or vine-like brown algae. (IHO Dictionary – S-32, Edition 5; 2611).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World  Seaweed – Eelgrass *Photograph, courtesy of the Pacific Hydrographic Branch*  Kelp *Photograph, courtesy of the Pacific Hydrographic Branch* *Paper Chart Symbol* *ECDIS Symbol*	**WEDKLP** (P, A)	CATWED (M) Category of weed/kelp	1 : kelp 2 : sea weed 3 : sea grass 4 : saragasso	E

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) **Sea weed**

   IHO Definition: General name for marine plants of the algae class which grow in long narrow ribbons. Also called sea grass. (International Maritime Dictionary, 2nd Edition).

3) **Sea grass**

   IHO Definition: Any grass-like marine alga. Eelgrass is one of the best known sea grasses. (IHO Dictionary – S-32, Edition 5; 4565).

4) **Saragasso**

IHO Definition: A certain type of sea weed, or more generally, a large floating mass of this sea weed. (IHO Dictionary – S-32, Edition 5; 4501).

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 **WEDKLP**.

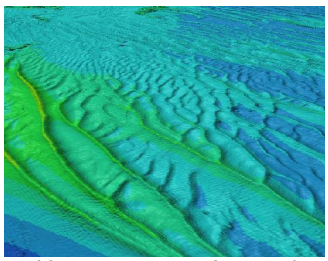
Geo feature:	Weed / kelp (**WEDKLP**)					
Attributes:	CATWED	NOBJNM	OBJNAM	INFORM	NINFOM	NTXTDS
	SCAMIN	TXTDSC	RECDAT	RECIND	SORDAT	SORIND

Remarks:

Distinction: Seabed area; vegetation.

12.3 Sand waves

IHO Definition: **SAND WAVES**. 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. (S-57, Appendix A – Chapter 1, Edition 3.1, Page 1.150, November 2000).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World  Sand Bar *Photograph, courtesy of the Pacific Hydrographic Branch*  Multi-Beam Image of a Sand Wave *Image, courtesy of the Atlantic Hydrographic Branch* *Paper Chart Symbol* *ECDIS Symbol*	**SNDWAV** (P, L, A)	VERLEN (O) Vertical length	Unit: Defined in the HUNI subfield of the DSPM record or the HUNITS attribute of the M_UNIT meta feature: metre Resolution: 0·1m Format: xxx.x Example: **24.5** for a vertical length of 24.5 metres	F

Vertical length: IHO Definition: The total vertical length of an object.

Remarks:
- For floating objects: The vertical distance from the surface of water to the highest point of that object.
- For fixed objects: The vertical distance from seabed or ground to the highest point of that object.
- For objects on top of other objects: the vertical distance from the lowest to the highest point of that object.
- Vertical length measurements do not require a datum.

INT 1 Reference: J 14

12.3.1 Sand waves (see S-4 – B-428.1)

If it is required to encode sand waves, this must be done using the feature **SNDWAV**.

Geo feature: Sand waves (**SNDWAV**)

Attributes:	VERLEN -	amplitude of the sand wave above the bottom				
	INFORM	NINFOM	NTXTDS	SCAMIN	TXTDSC	RECDAT
	RECIND	SORDAT	SORIND			

Remarks:

Distinction: Seabed area.

12.4 Springs in the seabed

IHO Definition: **SPRING**. 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, Edition 5; 4939).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**SPRING** (P)			

INT 1 Reference: J 15

12.4.1 Springs in the seabed (see S-4 – B-428.3)

If it is required to encode a spring from the seabed, it must be done using the feature **SPRING**.

Geo feature: Spring (**SPRING**)
Attribute: NOBJNM OBJNAM INFORM NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND SORDAT SORIND

Remarks:

Distinction:

13 Rocks, Wrecks, Obstructions

13.1 Land area

IHO Definition: **LAND AREA**. The solid portion of the Earth's surface, as opposed to sea, water. (IHO Dictionary – S-32, Edition 5; 2635).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**LNDARE** (P, L, A)	CONDTN (O) Condition	~~1 : under construction~~ ~~2 : ruined~~ 3 : under reclamation ~~4 : wingless~~ ~~5 : planned construction~~	E
		OBJNAM (O) Object name		S
		STATUS (O) 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~~	L

Comment [j142]: S-57 Extension 06/01.

Condition: IHO Definition:

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.

Object name: IHO Definition: The individual name of an object.

INT 1 Reference: K 10

13.1.1 Land area

Land areas that are never covered by the sea must be encoded using the feature **LNDARE**.

Rivers, canals, lakes, basins and docks, which are not navigable at the optimum display scale for the ENC data, must be encoded on top of **LNDARE** or **UNSARE** features (see clause X.X).

LNDARE features of type area are part of Group 1.

Geo feature: Land area (**LNDARE**)

Attributes:	CONDTN	OBJNAM	NOBJNM	INFORM	NINFOM	STATUS
	NTXTDS	SCAMIN	TXTDSC	RECDAT	RECIND	SORDAT
	SORIND					

Remarks:

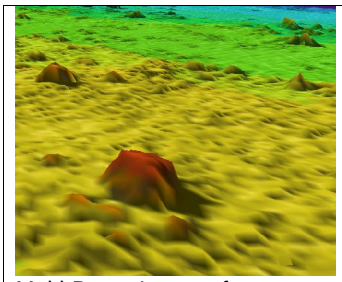
- If it is required to describe the natural scenery of the land, it must be done using the feature **LNDRGN** (see clause X.X).
- **LNDARE** is usually of type area; it may, however, be of type point (e.g. islet, rock that does not cover), or of type line (e.g. islet, offshore bar, isthmus).

Distinction: Canal; coastline; depth area; lake; land region; river; seabed area; shoreline construction; vegetation.

13.2 Rocks (always dry/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, Appendix A – Chapter 1, Edition 3.1, Page 1.194, November 2000).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World  Rock – Covers and Uncovers *Photograph, courtesy of the Pacific Hydrographic Branch*  Rock Awash at Chart Datum *Photograph, courtesy of the Pacific Hydrographic Branch*  Submerged Rock *Photograph, courtesy of the Pacific Hydrographic Branch*	**UWTROC** (P)	EXPSOU (O) Exposition of sounding	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~~	E
		NATQUA (O) Nature of surface – qualifying terms	~~1 : fine~~ ~~2 : medium~~ ~~3 : coarse~~ ~~4 : broken~~ ~~5 : sticky~~ 6 : soft 7 : stiff 8 : volcanic 9 : calcareous ~~10 : hard~~	L
		NATSUR (O) Nature of surface	~~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	L
		OBJNAM (O) Object name		S
		QUASOU (O) Quality of sounding measurement	~~1 : depth known~~ 2 : 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)	L

 Multi-Beam Image of Underwater Rock *Image, courtesy of the Atlantic Hydrographic Branch* *Paper Chart Symbol* *ECDIS Symbol*			~~10 : maintained depth~~ ~~11 : not regularly maintained~~	
		STATUS (O) 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~~	L
		TECSOU (O) Technique of sounding measurement	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~~	L
		VALSOU (m) Value of sounding	Unit: Defined in the DUNI subfield of the DSPM record or the DUNITS attribute of the M_UNIT meta feature: metre 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	F
		VERDAT (O) Vertical datum	1 : Mean low water springs 2 : Mean lower low water springs 3 : Mean sea level 4 : Lowest low water 5 : Mean low water	E

Comment [j143]: S-57 Extension 06/01.

			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)~~	
		WATLEV (m) Water level effect	~~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~~	E

Nature of surface: IHO Definition:

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, Edition 5; 4415).

14) **Coral**

IHO Definition: Hard calcareous skeletons of many tribes of marine polyps. (IHO Dictionary – S-32, Edition 5; 1061).

18) **Boulder**

IHO Definition: A rounded rock with diameter of 256 mm or larger. (Adapted from IHO Dictionary – S-32, Edition 5; 527).

Remarks:

- Mud, sand, stone, rock are terms used for the general description. Clay, silt, gravel, pebbles, cobbles are more specific terms related to particle size.

Value of sounding: IHO Definition: The value of the measurement of a sounding relative to the chart datum.

Water level effect: IHO Definition:

3) **Always under water / submerged**

IHO Definition: Remains covered by water at all times under average meteorological conditions.

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, Edition 5; 1111).

5) **Awash**

IHO Definition: Flush with, or washed by the waves at low water under average meteorological conditions. (Adapted from IHO Dictionary – S-32, Edition 5; 308).

Remarks:
- The attribute "water level effect" encodes the effect of the surrounding water on an object.

INT 1 Reference: K 11

13.2.1 Rocks which do not cover (islets)

An area feature must be encoded using:
- A **LNDARE** feature of type area (mandatory)
- **COALNE** or **SLCONS** features of type line (mandatory)
- **LNDELV** features of type point (optional)

A line feature must be encoded using:
- A **LNDARE** feature of type line (mandatory)
- **LNDELV** features of type point (optional)

A point feature must be encoded using:
- A **LNDARE** feature of type point (mandatory)
- A **LNDELV** feature of type point (optional)

13.2.2 Rocks which may cover

These rocks may cover and uncover, may be awash, or may be always underwater.

Geo feature: Underwater / awash rock (**UWTROC**)
Attributes: EXPSOU - indicates features with a "value of sounding" within or not within the range of depth of the surrounding area
NATQUA NATSUR NOBJNM OBJNAM
QUASOU - see Table below.
SOUACC - see use of the meta feature **M_QUAL** (clause X.X)
STATUS - *18* - existence doubtful
TECSOU
VALSOU - see Table below.
WATLEV - see Table below.
INFORM NINFOM NTXTDS SCAMIN TXTDSC RECDAT
RECIND
SORDAT - year of report, for reported but not confirmed danger
SORIND

Rock or coral reef	INT 1	WATLEV	QUASOU	Comment

Covers and uncovers, depth unknown	K11	*4*	*2*	
Covers and uncovers, depth known	K11	*4*	any value except *2*	Negative value for VALSOU
Awash	K12	*5*		
Underwater rock, depth unknown	K13	*3*	*2*	
Underwater rock, depth known	K14	*3*	any value except *2*	
Reported, not confirmed	I3.1,3.2	*3,4* or *5*	*9*	If available, the year reported should be encoded in SORDAT. The attribute QUAPOS should be set to *8* (reported, not confirmed).

Remarks:

- All **UWTROC** features should be encoded using one of the above combinations of attributes.
- A rock represented by a spot sounding and an associated nature of seabed (underwater rock not dangerous to surface navigation) may be encoded using a single **UWTROC** feature.
- For area rock features, see clause X.X.
- When a group of rocks is surrounded by a danger line, each rock should be encoded as a separate **UWTROC** feature covered by an obstruction area feature (**OBSTRN**).

Distinction: Obstruction; sounding; wreck.

13.3 Wrecks

IHO Definition: **WRECKS**. The ruined remains of a stranded or sunken vessel which has been rendered useless. (IHO Dictionary – S-32, Edition 5; 6027).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World  Wreck *Photograph, courtesy of the Pacific Hydrographic Branch*	**WRECKS** (P, A)	CATWRK (m) Category of wreck	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	E
		CONRAD (O) Conspicuous, radar	1 : radar conspicuous ~~2 : not radar conspicuous~~ ~~3 : radar conspicuous (has radar reflector)~~	E
 Wreck Showing Mast *Photograph, courtesy of the Pacific Hydrographic Branch*		CONVIS (O) Conspicuous, visually	1 : visually conspicuous ~~2 : not visually conspicuous~~	E
		EXPSOU (O) Exposition of sounding	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~~	E
 Wreck Submerged *Photograph, courtesy of the Pacific Hydrographic Branch*		OBJNAM (O) Object name		S
		QUASOU (O) Quality of sounding measurement	~~1 : depth known~~ 2 : 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~~	L
 Multi-Beam Image of Submerged Wreck *Image, courtesy of the Atlantic Hydrographic Branch*		STATUS (O) Status	~~1 : permanent~~ ~~2 : occasional~~ ~~3 : recommended~~ ~~4 : not in use~~ ~~5 : periodic/intermittent~~	L

 Visible Wreck *Photograph, courtesy of the Atlantic Hydrographic Branch* *Paper Chart Symbol* *ECDIS Symbol*			~~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~~	
		TECSOU (O) Technique of sounding measurement	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~~	L
		VALSOU (m) Value of sounding	Unit: Defined in the DUNI subfield of the DSPM record or the DUNITS attribute of the M_UNIT meta feature: metre 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	F
		VERDAT (O) Vertical datum	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	E

Comment [j144]: S-57 Extension 06/01.

			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)~~	
		WATLEV (M) Water level effect	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~~	E

Category of wreck: IHO Definition:

1) **Non-dangerous wreck**

   IHO Definition: A wreck which is not considered to be dangerous to surface navigation.

2) **Dangerous wreck**

   IHO Definition: A wreck which is considered to be dangerous to surface navigation.

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. (IHO Chart Specifications, S-4).

4) **Wreck showing mast/masts**

   IHO Definition: Wreck of which only the mast(s) is visible at the sounding datum indicated.

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.

Value of sounding: IHO Definition: The value of the measurement of a sounding relative to the chart datum.

Water level effect: IHO Definition:

1) **Partly submerged at high water**

IHO Definition: Partially covered and partially dry at high water.

2) **Always dry**

IHO Definition: Not covered at high water under average meteorological conditions.

3) **Always under water / submerged**

IHO Definition: Remains covered by water at all times under average meteorological conditions.

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, Edition 5; 1111).

5) **Awash**

IHO Definition: Flush with, or washed by the waves at low water under average meteorological conditions. (Adapted from IHO Dictionary – S-32, Edition 5; 308).

Remarks:

- The attribute "water level effect" encodes the effect of the surrounding water on a feature.

INT 1 Reference: K 20-30

13.3.1 Wrecks

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

Geo feature: Wreck (**WRECKS**)
Attributes:
CATWRK - see Table 6.2 below
CONRAD CONVIS
EXPSOU - indicates objects with a "value of sounding" within or not within the range of depth of the surrounding area
HEIGHT - only if WATLEV = 1 or 2
NOBJNM OBJNAM
QUASOU - see Table 6.2 below
SOUACC - see use of the meta object **M_QUAL** (clause 2.2.3.1)
STATUS
TECSOU - see Table 6.2 below
VALSOU
WATLEV - see Table 6.2 below
INFORM NINFOM NTXTDS SCAMIN PICREP TXTDSC
RECDAT RECIND SORDAT SORIND

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…	M4	INT 1	CATWRK	WATLEV	QUASOU	TECSOU
Showing any part of hull or superstructure	422.2	K24 IK20	*5*	*1,2* or *4*	/	/
Covers and uncovers	422.2	K24 K21	*4* or *5*	*4*		
Awash				5		
The mast only is visible at high water	422.5	K25	*4* or *5*	2	/	/
The mast only is visible at low water	422.5	K25	*4*	4		
Measured depth	422.4	K26	*1* or *2*	*3*	*1* or *6*	

Depth measured and swept by wire drag	422.3	K27	*1* or *2*	*3*	*6*	*6*
Depth unknown, considered dangerous by the responsible producing authority	422.5	K28	*2*	*3*	*2*	*/*
Depth unknown, not considered dangerous by the responsible producing authority	422.6	K29	*1*	*3*	*2*	*/*
Depth unknown, with a safe clearance	422.7	K30	*1* or *2*	*3*	*7*	*/*
Distributed remains of wreck	422.8	K31	*3*			
Reported, not confirmed	424.5	I 3.1,3.2			*9*	

All wrecks should be encoded using one of the above combinations of attributes.

13.3.1.1 Where a wreck is shown with its true shape (large scale ENCs)

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 **WRECKS** feature of type area with all populated attributes applying to the highest point of the wreck.
- **LNDELV** 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 attributes INFORM and NINFOM.
- **SOUNDG** 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 INFORM and NINFOM, which means that these soundings must be encoded individually.

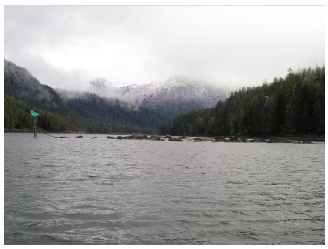
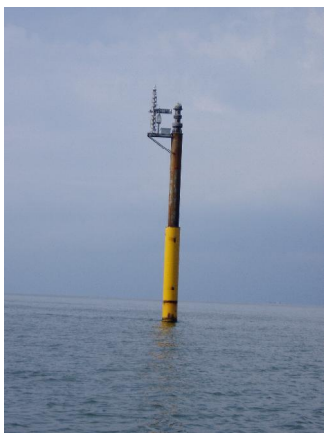
Remarks:

- A **WRECKS** feature of type area must be covered by an area feature from Group 1 as appropriate.
- If it is required to encode a wreck whose true depth is unknown, but for which there is a safe clearance depth, it must be done using the attribute VALSOU and the attribute QUASOU = *7* (least depth unknown, safe clearance at value shown).

Distinction: Depth area; hulk; obstruction; sounding; underwater/awash rock.

13.4 Obstructions

IHO Definition: **OBSTRUCTION.** In marine navigation, anything that hinders or prevents movement, particularly anything that endangers or prevents passage of a vessel. The term is usually used to refer to an isolated danger to navigation. (IHO Dictionary – S-32, Edition 5; 3503).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World  Foul Area *Photograph, courtesy of the Pacific Hydrographic Branch*	**OBSTRN** (P, L, A)	CATOBS (O) Category of obstruction	1 : snag/stump 2 : wellhead 3 : diffuser 4 : crib 5 : fish haven 6 : foul area 7 : foul ground 8 : ice boom 9 : ground tackle 10 : boom	E
 Ground Tackle *Photograph, courtesy of the Pacific Hydrographic Branch*		CONDTN (O) Condition	1 : under construction 2 : ruined 3 : under reclamation ~~4 : wingless~~ 5 : planned construction	E
		EXPSOU (O) Exposition of sounding	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~~	E
 Pipe *Photograph, courtesy of the Atlantic Hydrographic Branch*		HEIGHT (m) Height	Unit: Defined in the HUNI subfield of the DSPM record or the HUNITS attribute of the M_UNIT meta feature: metre Resolution: 0·1m Format: xxx.x Example: **73** for a height of 73 metres	F
		NATCON (O) Nature of construction	1 : masonry 2 : concreted 3 : loose boulders 4 : hard surfaced ~~5 : unsurfaced~~ 6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted	L
		NATQUA (O)	~~1 : fine~~ ~~2 : medium~~	L

 Wellhead *Photograph, courtesy of the Atlantic Hydrographic Branch*  Wellhead *Photograph, courtesy of the Atlantic Hydrographic Branch* *Paper Chart Symbol* *ECDIS Symbol*		Nature of surface – qualifying terms	~~3 : coarse~~ 4 : broken ~~5 : sticky~~ ~~6 : soft~~ ~~7 : stiff~~ 8 : volcanic 9 : calcareous ~~10 : hard~~	
		NATSUR (O) Nature of surface	~~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	L
		PRODCT (O) 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~~ ~~16 : sawdust/wood chips~~ ~~17 : scrap metal~~ ~~18 : liquefied natural gas (LNG)~~ ~~19 : liquefied petroleum gas (LPG)~~ ~~20 : wine~~ ~~21 : cement~~ ~~22 : grain~~	E
		QUASOU (O) Quality of sounding measurement	~~1 : depth known~~ 2 : 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~~	L

			~~11 : not regularly maintained~~	
		STATUS (O) 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~~	L
		TECSOU (O) Technique of sounding measurement	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~~	L
		VALSOU (m) Value of sounding	Unit: Defined in the DUNI subfield of the DSPM record or the DUNITS attribute of the M_UNIT meta feature: metre 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	F
		VERDAT (O) Vertical datum	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	E

Comment [j145]: S-57 Extension 06/01.

			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)~~	
		WATLEV (M) Water level effect	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~~	E

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, Edition 5; 4794).

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, Edition 5; 5976).

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.

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.

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.

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, Edition 5; 1915).

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, Edition 5; 442.8).

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.

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, Edition 5; 505).

Height: IHO Definition: The value of the vertical distance to the highest point of the object, measured from a specified vertical datum.

Value of sounding: IHO Definition: The value of the measurement of a sounding relative to the chart datum.

INT 1 Reference: K 1, 31, 40-43, 46.1-2; L 21, 23; Q 42

13.4.1 Obstructions and foul areas

If it is required to encode snags, stumps, wellheads, diffusers, cribs, fish havens, foul areas, foul grounds, booms, ice booms or ground tackle, it must be done using the feature **OBSTRN**.

Geo feature: Obstruction (**OBSTRN**)
Attributes:
CATOBS CONDTN
EXPSOU - indicates objects with a “value of sounding” within or not within the range of depth of the surrounding area
HEIGHT - only if WATLEV = *1* or *2*
NATCON NATQUA NATSUR NOBJNM OBJNAM
PRODCT - only used for wellheads
QUASOU - see Table below
SOUACC - see use of the meta object **M_QUAL** (clause X.X)
STATUS
TECSOU - see Table below
VALSOU
VERLEN - distance above the sea bed
WATLEV - see Table below
INFORM NINFOM NTXTDS SCAMIN TXTDSC RECDAT

RECIND SORDAT SORIND

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	WATLEV	QUASOU	TECSOU
Depth unknown	IK40	*3* or *4*	*2*	/
Least depth known	IK41	*3* or *4*	*1* or *6*	
Swept by wire to the depth shown	IK42	*3*	*6*	*6*

All obstructions should be encoded using one of the above combinations of attributes.

Remarks:

- If the nature of a dangerous underwater feature, dangerous underwater area, or floating feature is not explicitly known, it must be encoded using **OBSTRN**.
- An **OBSTRN** feature of type area must be covered by an area feature from Group 1 as appropriate.
- A danger line, bordering an area through which navigation is not safe, should be encoded using an **OBSTRN** feature of type area, with attribute CATOBS = *6* (foul area).
- A danger circle that surrounds a single symbol or sounding (e.g. INT1 – K26, K27, K40(b) or K 41 to K43.1) must not be encoded as a separate area. However, when a danger line indicates the true shape of the feature, it should be encoded using **WRECKS** or **OBSTRN** features of type area. A single sounding enclosed by a danger circle must be encoded using an **OBSTRN** feature of type point. The sounding value, in this case, must be encoded using the attribute VALSOU, with the attribute EXPSOU populated only if shoaler than or equal to the range of depth of the surrounding area.
- In certain circumstances where an obstruction is always dry (e.g. cribs), it may be covered by a **LNDARE** feature.

Distinction: Depth area; hulk; obstruction; sounding; underwater/awash rock.

13.5 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, Appendix A – Chapter 1, Edition 3.1, Page 1.70, November 2000).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World  Fish Pens *Photograph, courtesy of the Pacific Hydrographic Branch*  Fish Traps *Photograph, courtesy of the Pacific Hydrographic Branch* *Paper Chart Symbol* *ECDIS Symbol*	**FSHFAC** (P, L, A)	CATFIF (O) Category of fishing facility	1 : fishing stake 2 : fish trap 3 : fish weir 4 : tunny net	E
		PEREND (O) Periodic date end	See below for description and example of formatted string value	A
		PERSTA (O) Periodic date start	See below for description and example of formatted string value	A
		STATUS (O) 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~~	L

Comment [j146]: S-57 Extension 06/01.

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, Edition 5; 1818).

2) **Fish trap**

   IHO Definition: A structure (usually portable) for catching fish. (IHO Dictionary – S-32, Edition 5; 1819).

3) **Fish weir**

   IHO Definition: A fence of stakes or stones set in a river or along the shore to trap fish. (IHO Dictionary – S-32, Edition 5; 5967).

4) **Tunny net**

IHO Definition: A net built at sea for catching tunny. (IHO Dictionary – S-32, Edition 5; 5700).

Periodic date end: IHO Definition: The end of the active period for a seasonal feature (e.g. a buoy). See also "date end".

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.

Periodic date start: IHO Definition: The start of the active period for a seasonal feature (e.g. a buoy). See also "date start".

Indication: The "periodic date srart" 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.

INT 1 Reference: K 44.1-2, 45

13.5.1 Fishing facilities (see S-4 – B-447.1 to B-447.3)

If it is required to encode a fishing facility it must be done using the feature **FSHFAC**.

Geo feature: Fishing facility (**FSHFAC**)

Attributes: CATFIF NOBJNM OBJNAM PEREND PERSTA STATUS
VERLEN - height of the feature above the seabed
INFORM NINFOM NTXTDS SCAMIN TXTDSC RECDAT
RECIND SORDAT SORIND

Remarks:

- It is recommended that if **FSHFAC** features are considered to be an obstruction or hazard to navigation, they should also be encoded with an **OBSTRN** 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.

Comment [j147]: ENC EB No. XX

Distinction: Marine farm/culture; obstruction.

13.6 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, Edition 5; 1811).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World  Fish Pens *Photograph, courtesy of the Pacific Hydrographic Branch*  Aquaculture Area *Photograph, courtesy of the Pacific Hydrographic Branch*  Oyster Farm and Pens *Photograph, courtesy of the Pacific Hydrographic Branch* *Paper Chart Symbol* *ECDIS Symbol*	**MARCUL** (P, L, A)	CATMFA (O) Category of marine farm	1 : crustaceans 2 : edible bivalve molluscs 3 : fish 4 : seaweed 5 : pearl culture farm	E
		EXPSOU (O) Exposition of sounding	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~~	E
		QUASOU (O) Quality of sounding measurement	~~1 : depth known~~ 2 : 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~~	L
		RESTRN (O) Restriction	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	L

Comment [j148]: MD8 – 5.Co.2

			19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artifacts prohibited 23 : cargo transhipment (lightering) prohibited 24 : dragging prohibited 25 : stopping prohibited 26 : landing prohibited 27 : speed restricted 28 : swimming prohibited	
		STATUS (O) 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~~	L
		VALSOU (m) Value of sounding	Unit: Defined in the DUNI subfield of the DSPM record or the DUNITS attribute of the M_UNIT meta feature: metre 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	F
		VERDAT (O) Vertical datum	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	E

Comment [j149]: S-57 Extension 06/01

Comment [j150]: S-57 Extension 06/01.

			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)~~	
		WATLEV (m) Water level effect	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	E

Category of marine farm/culture: IHO Definition:

1) **Crustaceans**

   IHO Definition: Hard shelled animals, for example crabs or lobsters.

2) **Edible bivalve molluscs**

   IHO Definition: Oysters/mussels/scallops …….

3) **Fish**

   IHO Definition: Vertebrate cold blooded animal with gills, living in water.

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.

Value of sounding: IHO Definition: The value of the measurement of a sounding relative to the chart datum.

Water level effect: IHO Definition:

1) **Partly submerged at high water**

   IHO Definition: Partially covered and partially dry at high water.

2) **Always dry**

   IHO Definition: Not covered at high water under average meteorological conditions.

3) **Always under water / submerged**

   IHO Definition: Remains covered by water at all times under average meteorological conditions.

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, Edition 5; 1111).

5) **Awash**

   IHO Definition: Flush with, or washed by the waves at low water under average meteorological conditions. (Adapted from IHO Dictionary – S-32, Edition 5; 308).

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.

INT 1 Reference: K 47, 48.1-2

13.6.1 Marine farms (see S-4 – B- 447.4 and B-447.6)

If it is required to encode a marine farm, it must be done using the feature **MARCUL**.

Geo feature:	Marine farm / culture (**MARCU**L)					
Attributes:	CATMFA	DATEND	DATSTA	EXPSOU	NOBJNM	OBJNAM
	PEREND	PERSTA	QUASOU	RESTRN	SOUACC	STATUS
	VALSOU					
	VERLEN -	height of the object above the seabed				
	WATLEV	INFORM	NINFOM	NTXTDS	SCAMIN	TXTDSC
	RECDAT	RECIND	SORDAT	SORIND		

When it is required to encode the minimum depth of the feature, the attributes EXPSOU and QUASOU and the mandatory attribute VALSOU must be used. When a **MARCUL** feature covers an area of the seafloor at the optimum display scale of the data, the value of the attribute VALSOU 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 WATLEV must be used to encode the water level of the shallowest section of the area, if partly or completely under water.

Remarks:

Distinction: Fishing facility; obstruction.

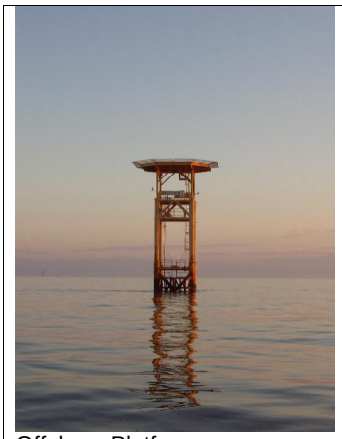
14 Offshore Installations

14.1 Offshore platform

IHO Definition: **OFFSHORE PLATFORM**. A permanent offshore structure, either fixed or floating. (IHO Dictionary – S-32, Edition 5; 3895).

Comment [j151]: MD8 – 7.Cl.11 and 7.Co.6.

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World  Offshore Platform *Photograph, courtesy of the Atlantic Hydrographic Branch*  Offshore Platform *Photograph, courtesy of the Atlantic Hydrographic Branch*	**OFSPLF** (P, A)	CATOFP (O) Category of offshore platform	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)	E
		COLOUR (O) 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	L
		COLPAT (m) Colour pattern	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	L
		CONDTN (O) Condition	1 : under construction 2 : ruined ~~3 : under reclamation~~ 4 : wingless 5 : planned construction	E
		CONRAD (O) Conspicuous,	1 : radar conspicuous ~~2 : not radar conspicuous~~ 3 : radar conspicuous (has radar	E

 Offshore Platform *Photograph, courtesy of the Atlantic Hydrographic Branch*  Offshore Platform *Photograph, courtesy of the Atlantic Hydrographic Branch* *Paper Chart Symbol* *ECDIS Symbol*		radar	reflector)	
		CONVIS (O) Conspicuous, visually	1 : visually conspicuous ~~2 : not visually conspicuous~~	E
		NATCON (O) Nature of construction	~~1 : masonry~~ 2 : concreted ~~3 : loose boulders~~ ~~4 : hard surfaced~~ ~~5 : unsurfaced~~ 6 : wooden 7 : metal ~~8 : glass reinforced plastic (GRP)~~ 9 : painted	L
		OBJNAM (O) Object name		S
		PRODCT (O) 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~~ ~~16 : sawdust/wood chips~~ ~~17 : scrap metal~~ ~~18 : liquefied natural gas (LNG)~~ ~~19 : liquefied petroleum gas (LPG)~~ ~~20 : wine~~ ~~21 : cement~~ ~~22 : grain~~	E
		STATUS (O) 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~~	L

			~~17 : un-watched~~ 18 : existence doubtful ~~19 : buoyed~~	

Comment [j152]: S-57 Extension 06/01.

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, Edition 5; XXX).

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. (IHO Dictionary – S-32, Edition 5; 4037).

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; 3493/3500).

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 sea bed. 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 sea bed, 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 sea bed 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, Edition 5; 240).

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 [j153]: MD8 – 7.Cl.6 and 7.Co.18.

9) **Accommodation platform**

IHO Definition: A platform used primarily for eating, sleeping and recreation purposes.

10) **Navigation, communication and control buoy (NCCB)**

IHO Definition: a floating structure with control room, power and storage facilities, attached to the sea bed by a flexible pipeline and cables.

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).

Remarks:

- The attribute “product” encodes the various substances which are transported, stored or exploited.

INT 1 Reference: L 2, 10, 11-15, 17

14.1.1 Offshore platforms (see S-4 – B-445.2)

If it is required to encode a permanent offshore platform, it must be done using the feature **OFSPLF**.

Geo feature:	Offshore platform (**OFSPLF**)					
Attributes:	CATOFP	COLOUR	COLPAT	CONDTN	CONRAD	CONVIS
	DATEND	DATSTA				
	HEIGHT -	for fixed platforms, referred to the vertical datum (see clause 2.1.2)				
	NATCON	NOBJNM	OBJNAM	PRODCT	STATUS	
	VERLEN -	for floating platforms, referred to the sea level				
	INFORM	NINFOM	NTXTDS	PICREP	SCAMIN	TXTDSC
	RECDAT	RECIND	SORDAT	SORIND		

Remarks:

- If it is required to encode sites of dismantled platforms, this must be done using **OBSTRN** features (see clause X.X), with attribute CATOBS = *7* (foul ground).
- Platforms may carry lights (see clause X.X), fog signals (see clause X.X) and helicopter platforms (see clause X.X).

Distinction: Offshore platform; exclusive economic zone.

14.2 Submarine cables

IHO Definition: **SUBMARINE CABLE**. An assembly of wires or fibres, or a wire rope or chain which has been laid underwater or buried beneath the seabed. (Hydrographic Service, Royal Australian Navy).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World  Submarine Cable Entry *Photograph, courtesy of the Pacific Hydrographic Branch*  Submarine Cable Sign *Photograph, courtesy of the Pacific Hydrographic Branch*  Underwater Cable *Photograph, courtesy of the Pacific Hydrographic Branch* *Paper Chart Symbol*	**CBLSUB** (L)	BURDEP (O) Buried depth	Unit: Defined in the HUNI subfield of the DSPM record or the HUNITS attribute of the M_UNIT meta feature: metre Resolution: 0·1m Format: xx.x Example: **2.5** for a depth of 2·5 metres	F
		CATCBL (O) Category of cable	1 : power line ~~3 : transmission line~~ 4 : telephone 5 : telegraph 6 : mooring cable/chain	E
		CONDTN (O) Condition	1 : under construction ~~2 : ruined~~ ~~3 : under reclamation~~ ~~4 : wingless~~ 5 : planned construction	E
		STATUS (O) 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~~	L

Comment [j154]: S-57 Extension 06/01.

ECDIS Symbol				

Buried depth: IHO Definition: The depth below the seabed to which an object is buried.

Category of cable: IHO Definition:

1) **Power line**

   IHO Definition: A cable used for the supply of electricity.

4) **Telephone**

   IHO Definition: A cable used for the transmission of telephone signals.

5) **Telegraph**

   IHO Definition: A cable used for the transmission of telegraph signals.

6) **Mooring cable/chain**

   IHO Definition: A cable or chain used to secure a mooring buoy or other floating structure.

INT 1 Reference: L 30.1, 31.1, 32

14.2.1 Submarine cables (see S-4 – B-443)

If it is required to encode a submarine cable, it must be done using the feature **CBLSUB**.

Geo feature: Cable, submarine (**CBLSUB**)

Attributes:

BURDEP - if the buried depth varies along the cable, the cable must be encoded as several features.

CATCBL CONDTN DATEND DATSTA

DRVAL1 - shallowest depth over the cable

DRVAL2 - deepest depth over the cable

NOBJNM OBJNAM STATUS INFORM NINFOM NTXTDS

SCAMIN TXTDSC RECDAT RECIND SORDAT SORIND

Remarks:

- Where a cable is disused, it should be encoded with the attribute STATUS = *4* (not in use), and the attribute CATCBL should not be encoded.

Distinction: Cable, overhead; cable area.

14.3 Submarine cable area

IHO Definition: **CABLE AREA**. An area which 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, Edition 5; XXXX).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World  Submarine Cable Entry *Photograph, courtesy of the Pacific Hydrographic Branch*  Submarine Cable Sign *Photograph, courtesy of the Pacific Hydrographic Branch*  Submarine Cable Area *Photograph, courtesy of the Atlantic Hydrographic Branch* *Paper Chart Symbol*	**CBLARE** (A)	CATCBL (O) Category of cable	1 : power line ~~3 : transmission line~~ ~~4 : telephone~~ 5 : telegraph 6 : mooring cable/chain	E
		RESTRN (O) Restriction	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 artifacts prohibited~~ ~~23 : cargo transhipment (lightering) prohibited~~ 24 : dragging prohibited ~~25 : stopping prohibited~~ ~~26 : landing prohibited~~ ~~27 : speed restricted~~ ~~28 : swimming prohibited~~	L
		STATUS (O) Status	~~1 : permanent~~ ~~2 : occasional~~ ~~3 : recommended~~ 4 : not in use ~~5 : periodic/intermittent~~ ~~6 : reserved~~ ~~7 : temporary~~	L

Comment [j155]: S-57 Extension 06/01.

ECDIS Symbol			~~8 : private~~ ~~9 : mandatory~~ ~~11 : extinguished~~ ~~12 : illuminated~~ ~~13 : historic~~ ~~14 : public~~ ~~15 : synchronized~~ ~~16 : watched~~ ~~17 : un-watched~~ ~~18 : existence doubtful~~ ~~19 : buoyed~~	

Comment [j156]: S-57 Extension 06/01.

Category of cable: IHO Definition:

1) **Power line**

IHO Definition: A cable used for the supply of electricity.

4) **Telephone**

IHO Definition: A cable used for the transmission of telephone signals.

5) **Telegraph**

IHO Definition: A cable used for the transmission of telegraph signals.

INT 1 Reference: L 30.2, 31.2

14.3.1 Submarine cable areas (see S-4 – B-443.2)

If it is required to encode a submarine cable area, it must be done using the feature **CBLARE**.

Geo feature: Cable area (**CBLARE**)

Attributes: CATCBL DATEND DATSTA NOBJNM OBJNAM RESTRN
STATUS - used only to encode the status of the area and not the status of the cables in the area.
INFORM NINFOM NTXTDS SCAMIN TXTDSC RECDAT
RECIND SORDAT SORIND

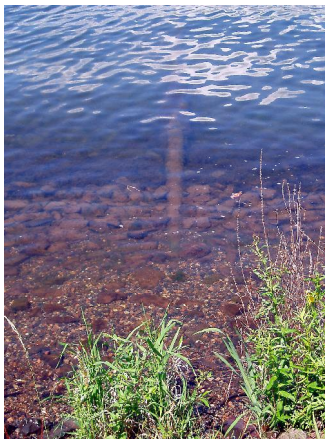
Remarks:

Distinction: Cable, overhead; cable, submarine.

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, Edition 5; 3857).

A submarine or land pipeline is a pipeline lying on or buried under the seabed or the land.

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World  Submarine Pipeline *Photograph, courtesy of the Pacific Hydrographic Branch* *Paper Chart Symbol* *ECDIS Symbol*	**PIPSOL** (P L)	BURDEP (O) Buried depth	Unit: Defined in the HUNI subfield of the DSPM record or the HUNITS attribute of the M_UNIT meta feature: metre Resolution: 0·1m Format: xx.x Example: **2.5** for a depth of 2·5 metres	F
		CATPIP (O) Category of pipeline/pipe	2 : outfall pipe 3 : intake pipe 4 : sewer 5 : bubbler system 6 : supply pipe	L
		CONDTN (O) Condition	1 : under construction 2 : ruined ~~3 : under reclamation~~ ~~4 : wingless~~ 5 : planned construction	E
		PRODCT (O) 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~~ ~~16 : sawdust/wood chips~~ ~~17 : scrap metal~~ 18 : liquefied natural gas (LNG) 19 : liquefied petroleum gas (LPG) ~~20 : wine~~ ~~21 : cement~~ ~~22 : grain~~	E
		RESTRN (O) Restriction	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited	L

Comment [j157]: Should not be allowed for S-101 ENCs – does not display in ECDIS. Refer ENC EB 29.

Comment [j158]: S-57 Extension 06/01.

			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 artifacts prohibited~~ ~~23 : cargo transhipment (lightering) prohibited~~ 24 : dragging prohibited ~~25 : stopping prohibited~~ ~~26 : landing prohibited~~ ~~27 : speed restricted~~ ~~28 : swimming prohibited~~	
		STATUS (O) 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~~	L

Comment [j159]: S-57 Extension 06/01.

Comment [j160]: S-57 Extension 06/01.

Buried depth: IHO Definition: The depth below the seabed to which an object is buried.

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.

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. (IHO Dictionary – S-32, Edition 5; 2468).

4) **Sewer**

IHO Definition: A pipe in a sewage system for carrying water or sewage to a disposal area.

5) **Bubbler system**

IHO Definition: A submerged pipe from which warm water bubbles, preventing the surrounding water from freezing.

6) **Supply pipe**

IHO Definition: A pipe used for supplying of gas or liquid product.

INT 1 Reference: D 29; L 40.1, 41.1, 42, 44

14.4.1 Pipelines, submarine or on land (see S-4 – B-377 and B-444)

If it is required to encode a submarine or land pipeline, it must be done using the feature **PIPSOL**.

Geo feature: Pipeline, submarine / on land (**PIPSOL**)

Attributes:

BURDEP - if the buried depth varies along the pipeline, the pipeline must be encoded as several features

CATPIP CONDTN DATEND DATSTA

DRVAL1 - shallowest depth over the pipeline

DRVAL2 - deepest depth over the pipeline

NOBJNM OBJNAM PRODCT STATUS VERLEN INFORM

NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND

SORDAT SORIND

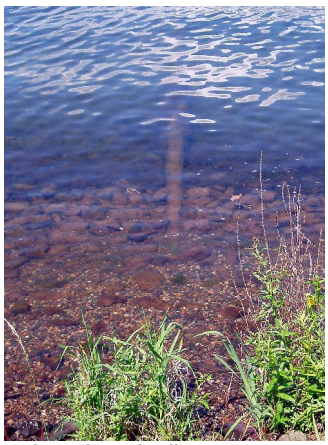
Remarks:

- Where a pipeline is disused, it should be encoded with the attribute STATUS = *4* (not in use), and the attributes CATPIP and PRODCT should not be encoded.

Distinction: Cable, overhead; cable, submarine.

14.5 Submarine pipeline area

IHO Definition: **PIPELINE AREA**. A submarine or land pipeline is a pipeline lying on or buried under the seabed or the land. A pipeline area contains one or more pipelines. (IHO Dictionary – S-32, Edition 5; XXX).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World  Submarine Pipeline *Photograph, courtesy of the Pacific Hydrographic Branch* *Paper Chart Symbol* *ECDIS Symbol*	**PIPARE** (P, A)	CATPIP (O) Category of pipeline/pipe	2 : outfall pipe 3 : intake pipe 4 : sewer 5 : bubbler system 6 : supply pipe	L
		PRODCT (O) 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~~ ~~16 : sawdust/wood chips~~ ~~17 : scrap metal~~ 18 : liquefied natural gas (LNG) 19 : liquefied petroleum gas (LPG) ~~20 : wine~~ ~~21 : cement~~ ~~22 : grain~~	E
		RESTRN (O) Restriction	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~~	L

			~~exploration/development restricted~~ ~~20 : drilling prohibited~~ ~~21 : drilling restricted~~ ~~22 : removal of historical artifacts prohibited~~ ~~23 : cargo transhipment (lightering) prohibited~~ 24 : dragging prohibited ~~25 : stopping prohibited~~ ~~26 : landing prohibited~~ ~~27 : speed restricted~~ ~~28 : swimming prohibited~~	
		STATUS (O) 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~~	L

Comment [j161]: S-57 Extension 06/01

Comment [j162]: S-57 Extension 06/01.

Category of pipeline/pipe: IHO Definition:

7) **Outfall pipe**

IHO Definition: A pipe (generally a sewer or drainage pipe) discharging in to the sea or a river.

8) **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. (IHO Dictionary – S-32, Edition 5; 2468).

9) **Sewer**

IHO Definition: A pipe in a sewage system for carrying water or sewage to a disposal area.

10) **Bubbler system**

IHO Definition: A submerged pipe from which warm water bubbles, preventing the surrounding water from freezing.

11) **Supply pipe**

IHO Definition: A pipe used for supplying of gas or liquid product.

INT 1 Reference: L 40.2, 41.2

14.5.1 Pipeline areas (see S-4 – B-444.2)

If it is required to encode a pipeline area, it must be done using the feature **PIPARE**.

Geo feature: Pipeline area (**PIPARE**)

Attributes:	CATPIP	DATEND	DATSTA	NOBJNM	OBJNAM	PRODCT	RESTRN
	STATUS -	used only to encode the status of the area and not the status of the pipelines in the area.					
	INFORM	NINFOM	NTXTDS	SCAMIN	TXTDSC	RECDAT	
	RECIND	SORDAT	SORIND				

Remarks:

- Where the pipes within a pipeline area are disused, the **PIPARE** should be encoded with the attribute STATUS = *4* (not in use), and the attributes CATPIP and PRODCT should not be encoded.

Distinction: Cable, overhead; pipeline, submarine/on land.

14.6 Offshore production area

IHO Definition: **OFFSHORE PRODUCTION AREA**. An area at sea within which there are production facilities. (S-57, Appendix A – Chapter 1, Edition 3.1, Page 1.113, November 2000).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**OSPARE** (A)	CATPRA (M) Category of production area	~~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~~	E
		CONDTN (O) Condition	1 : under construction 2 : ruined ~~3 : under reclamation~~ 4 : wingless 5 : planned construction	E
		CONRAD (O) Conspicuous, radar	1 : radar conspicuous ~~2 : not radar conspicuous~~ 3 : radar conspicuous (has radar reflector)	E
		CONVIS (O) Conspicuous, visually	1: visually conspicuous ~~2: not visually conspicuous~~	E
		PRODCT (O) 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~~ ~~16 : sawdust/wood chips~~ ~~17 : scrap metal~~ ~~18 : liquefied natural gas (LNG)~~ ~~19 : liquefied petroleum gas (LPG)~~ ~~20 : wine~~ ~~21 : cement~~ ~~22 : grain~~	L

		RESTRN (O) Restriction	~~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 artifacts prohibited~~ ~~23 : cargo transhipment (lightering) prohibited~~ ~~24 : dragging prohibited~~ ~~25 : stopping prohibited~~ ~~26 : landing prohibited~~ ~~27 : speed restricted~~ ~~28 : swimming prohibited~~	L
		STATUS (O) 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	L
Category of production area: IHO Definition: 2) **Mine**				

Comment [j163]: S-57 Extension 06/01.

Comment [j164]: S-57 Extension 06/01.

IHO Definition: An excavation in the earth for the purpose of extracting earth materials.

4) **Power station area**

IHO Definition: A stationary plant containing apparatus for large-scale conversion of some form of energy (hydraulic, steam, chemical, nuclear, etc.) into electrical energy.

5) **Refinery area**

IHO Definition: A system of process units used to convert crude petroleum into fuels, lubricants and other petroleum-derived products.

8) **Tank farm**

IHO Definition: An area in which a number of large-capacity storage tanks are located, generally used for crude oil or petroleum products.

9) **Wind farm**

IHO Definition: An area in which numerous wind motors are located.

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).

Remarks:

- The attribute “product” encodes the various substances which are transported, stored or exploited.

INT 1 Reference: L 4

14.6.1 Offshore production areas (see S-4 – B-445.3)

If it is required to encode an offshore production area, it must be done using the feature **OSPARE**.

Geo feature: Offshore production area (**OSPARE**)

Attributes:	CATPRA	CONDTN	CONRAD	CONVIS	DATEND	DATSTA
	HEIGHT	NOBJNM	OBJNAM	PRODCT	RESTRN	STATUS
	VERLEN	INFORM	NINFOM	NTXTDS	SCAMIN	TXTDSC
	RECDAT	RECIND	SORDAT	SORIND		

Remarks:

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)

If it is required to encode leading, clearing and transit lines and recommended tracks, it must be done using the features **NAVLNE** and **RECTRC**, and related point navigational aids features. This applies for visual and radio navigational aids.

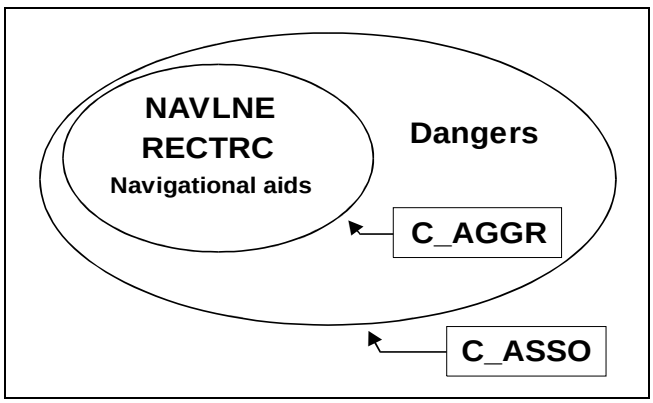
Relationships should be defined between these features (see clauses X.X and X.X).

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 **NAVLNE**, **RECTRC** and the navigational aids features should be aggregated using a collection feature **C_AGGR** (see clause XX).

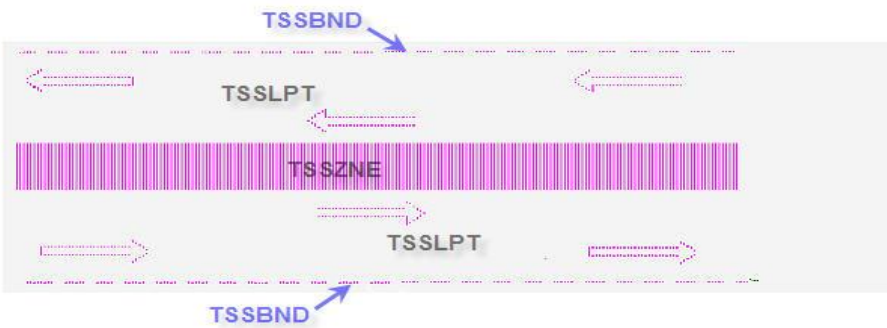
This aggregation feature may also be associated, using a collection feature **C_ASSO** (see clause XX), with the dangers (e.g. **OBSTRN**, **WRECKS**, **UWTROC** features) marked by the clearing or transit line.



Range systems

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: **TSSLPT** (traffic separation scheme lane part) and **DWRTPT** (deep water route parts).



Traffic Lanes

15.3 Traffic separation scheme systems

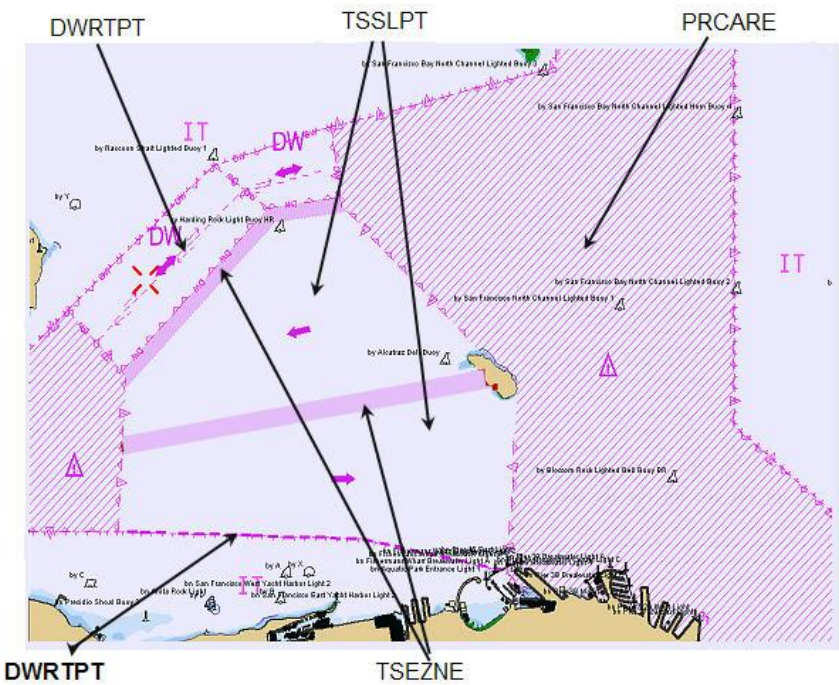
A traffic separation scheme is a routing measure which separates opposing streams of marine traffic by the establishment of separation zones or lines and traffic lanes. It may include inshore traffic zones or deep water routes. A separation zone or line separates:

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.

To encode a traffic separation scheme (TSS) system, the **DWRTCL**, **DWRTPT**, **ISTZNE**, **PRCARE**, **TSELNE**, **TSEZNE**, **TSSBND**, **TSSCRS**, **TSSLPT**, **TSSRON** features, and the navigational aids features (if they are stated in the regulation defining the TSS or DW), must be aggregated using the collection feature **C_AGGR** (see clause XX). The attribute OBJNAM for the **C_AGGR** feature is used to encode the name of the TSS, and the attribute INFORM or TXTDSC should be used to encode textual information about the whole TSS.



Sample Traffic Separation Scheme (TSS) and Deep Water Route (DW)

15.4 Navigation line

IHO Definition: **NAVIGATION LINE**. ~~A navigation line is~~ 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 Oceanograhique de la Marine, France).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**NAVLNE** (L)	CATNAV (M) Category of navigation line	1: clearing line 2: transit line 3: leading line bearing a recommended track	E
		ORIENT (M) Orientation	Unit: Degree (°) – minimum value 0; maximum value 360 Resolution: 0·01° Format: xxx.xX Example: **246.7** for an orientation of 246·7 degrees	F
		STATUS (O) 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~~	L

Comment [j165]: S-57 Extension 06/01.

Category of offshore platform: IHO Definition:

1) **Clearing line**

   IHO Definition: A straight line that marks the boundary between a safe and a dangerous area or that passes clear of a navigational danger. (Adapted from IHO Dictionary – S-32, Edition 5; 826).

2) **Transit line**

   IHO Definition: A line passing through one or more fixed marks.

3) **Leading line bearing a recommended track**

   IHO Definition: A line passing through one or more clearly defined objects, along the path of which a vessel can approach safely up to a certain distance off. (Adapted from IHO Dictionary – S-32, Edition 5; 2696).

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).

INT 1 Reference: M 1-3

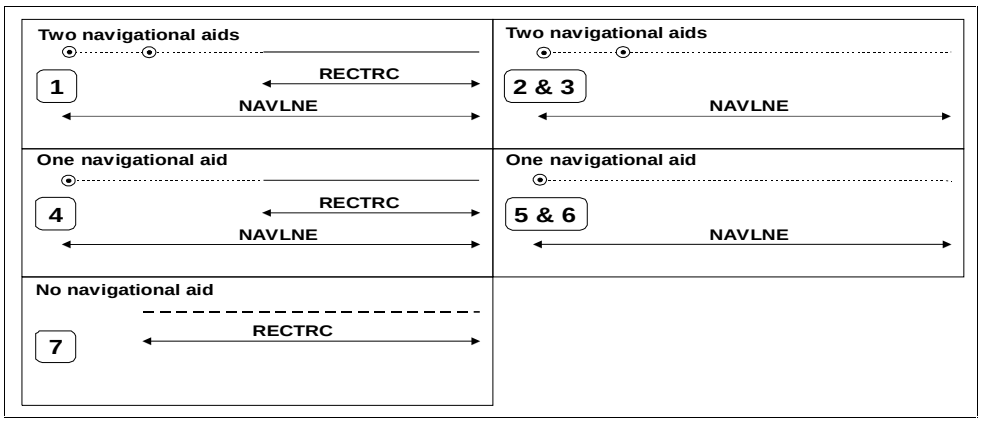
15.4.1 Navigation lines

If it is required to encode a navigation line, it must be done using the feature **NAVLNE**.

Geo feature: Navigation line (**NAVLNE**)
Attributes: CATNAV DATEND DATSTA
ORIENT - value of the bearing from seaward
PEREND PERSTA STATUS
INFORM - legend as shown on the source
NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND
SORDAT SORIND

The use of **NAVLNE** and **RECTRC** is defined in more detail in the following Table, and in the Figure below:

Figure		NAVLNE	RECTRC	Navigational aids
1	Recommended track on a leading line	CATNAV = *3*	CATTRK = *1*	at least 2
2	Clearing line on marks in line	CATNAV = *1*	none	at least 2
3	Transit line on marks in line	CATNAV = *2*	none	at least 2
4	Recommended track on a bearing	CATNAV = *3*	CATTRK = *1*	1
5	Clearing line on a bearing	CATNAV = *1*	none	1
6	Transit line on a bearing	CATNAV = *2*	none	1
7	Recommended track not based on fixed marks	none	CATTRK = *2*	none



Remarks:
- 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 **NAVLNE** feature with the attribute CATNAV 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 INFORM (e.g. *Measured distance = 1450 metres*).

If it is required to encode the transit lines, they must be done using **NAVLNE** features, with CATNAV = *2*

(transit line).

If it is required to encode the beacons, they must be done using **BCNSPP** features, with attribute CATSPM = *17* (measured distance mark).

Where the entire measured distance system exists within a single cell, 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.

15.5 Recommended track

IHO Definition: **RECOMMENDED TRACK**. A track recommended to all or only certain vessels. (IHO Dictionary – S-32, Edition 5; 5576).

The recommended track is that portion of a navigation line that a ship should use for navigation. (S-57, Appendix A – Chapter 1, Edition 3.1, Page 1.138, November 2000).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**RECTRC** (L, A)	CATTRK (M) Category of recommended track	1 : based on a system of fixed marks 2 : not based on a system of fixed marks	E
		DRVAL1 (O) Depth range value 1	Unit: Defined in the DUNI subfield of the DSPM record or the DUNITS attribute of the M_UNIT meta feature: metre Resolution: 0·1m Format: sxxxxx.x s: sign, negative values only Example: **50** for a minimum depth of 50 metres	F
		ORIENT (M) Orientation	Unit: Degree (°) – minimum value 0; maximum value 360 Resolution: 0·01° Format: xxx.xX Example: **246.7** for an orientation of 246·7 degrees	F
		QUASOU (O) Quality of sounding measurement	1 : depth known ~~2 : 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~~	L
		STATUS (O) Status	~~1 : permanent~~ ~~2 : occasional~~ ~~3 : recommended~~ ~~4 : not in use~~ ~~5 : periodic/intermittent~~ ~~6 : reserved~~ ~~7 : temporary~~ ~~8 : private~~	L

			9 : mandatory ~~11 : extinguished~~ ~~12 : illuminated~~ ~~13 : historic~~ ~~14 : public~~ ~~15 : synchronized~~ ~~16 : watched~~ ~~17 : un-watched~~ ~~18 : existence doubtful~~ ~~19 : buoyed~~	
		TECSOU (O) Technique of sounding measurement	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~~	L
		TRAFIC (M) Traffic flow	1 : inbound 2 : outbound 3 : one-way 4 : two-way	E

Comment [j166]: S-57 Extension 06/01.

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.

Comment [j167]: 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 series of structures or features in line.

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).

Traffic flow: IHO Definition:

1) **Inbound**

IHO Definition: Traffic flow in a general direction toward a port or similar destination.

2) **Outbound**

IHO Definition: Traffic flow in a general direction away from a port or similar point of origin.

3) **One-way**

IHO Definition: Traffic flow in one general direction only.

4) **Two-way**

IHO Definition: Traffic flow in two generally opposite directions.

INT 1 Reference: M 3-4, 5.1, 5.2, 6

15.5.1 Recommended tracks

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 **RECTRC**.

Geo feature: Recommended track (**RECTRC**)
Attributes: CATTRK DATEND DATSTA
DRVAL1 - minimum depth along the track
NOBJNM OBJNAM ORIENT PEREND PERSTA QUASOU
SOUACC STATUS TECSOU TRAFIC
INFORM - maximum authorised draft (e.g. *Maximum authorised draft = 14 metres*)
NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND
SORDAT SORIND

Remarks:

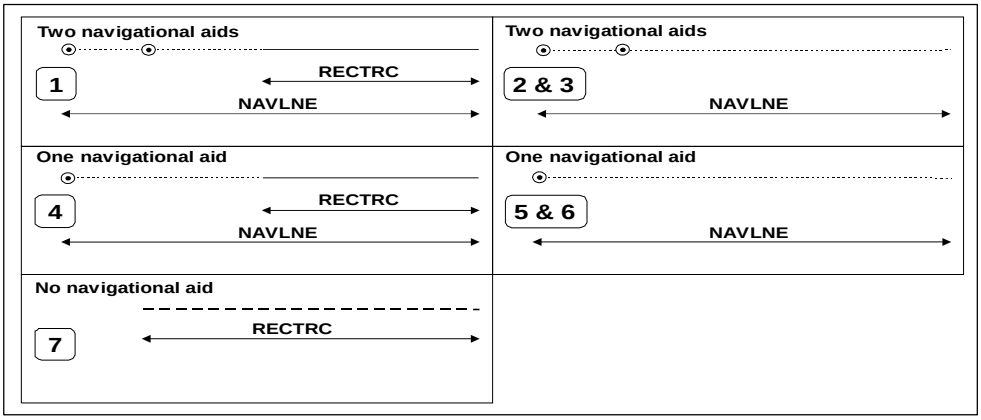
- In the case of a two-way recommended track, only one value of orientation is encoded (in the attribute ORIENT); the other value can be deduced (i.e. the value in ORIENT + 180 degrees). The va orientation encoded on the attribute ORIENT should be the value of the bearing from seaward. If it possible to define a seaward direction, the value that is less than 180° should be used.
- When the traffic flow is one way, the direction of digitising of an object of type line must be the same direction of the traffic flow. This is to ensure the correct representation in the ECDIS of the direction followed.

Comment [j168]: S-57 Chapter 1.

Comment [j169]: ENC EB No. 1c

The use of **NAVLNE** and **RECTRC** is defined in more detail in the following Table, and in the Figure below.

Figure 15		NAVLNE	RECTRC	Navigational aids
1	Recommended track on a leading line	CATNAV = *3*	CATTRK = *1*	at least 2
2	Clearing line on marks in line	CATNAV = *1*	none	at least 2
3	Transit line on marks in line	CATNAV = *2*	none	at least 2
4	Recommended track on a bearing	CATNAV = *3*	CATTRK = *1*	1
5	Clearing line on a bearing	CATNAV = *1*	none	1
6	Transit line on a bearing	CATNAV = *2*	none	1
7	Recommended track not based on fixed marks	none	CATTRK = *2*	none



Distinction: 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, 2nd Edition).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**FAIRWY** (A)	DRVAL1 (O) Depth range value 1	Unit: Defined in the DUNI subfield of the DSPM record or the DUNITS attribute of the M_UNIT meta feature: metre Resolution: 0·1m Format: sxxxxx.x s: sign, negative values only Example: **50** for a minimum depth of 50 metres	F
		ORIENT (O) Orientation	Unit: Degree (°) – minimum value 0; maximum value 360 Resolution: 0·01° Format: xxx.xX Example: **246.7** for an orientation of 246·7 degrees	F
		QUASOU (O) Quality of sounding measurement	1 : depth known ~~2 : 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~~	L
		RESTRN (O) Restriction	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~~	L

			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 artifacts prohibited~~ ~~23 : cargo transhipment (lightering) prohibited~~ ~~24 : dragging prohibited~~ ~~25 : stopping prohibited~~ ~~26 : landing prohibited~~ 27 : speed restricted 28 : swimming prohibited	
		STATUS (O) 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	L
		TRAFIC (M) Traffic flow	1 : inbound 2 : outbound 3 : one-way 4 : two-way	E

Depth range value 1: IHO Definition: The minimum (shoalest) value of a depth range.

Remarks:

- Where the area dries, the value is negative.

Traffic flow: IHO Definition:

1) **Inbound**

   IHO Definition: Traffic flow in a general direction toward a port or similar destination.

2) **Outbound**

   IHO Definition: Traffic flow in a general direction away from a port or similar point of origin.

Comment [j170]: S-57 Extension 06/01.

Comment [j171]: S-57 Extension 06/01.

Comment [j172]: S-57 App A, Ch 2 – 2.124.

3) **One-way**

IHO Definition: Traffic flow in one general direction only.

4) **Two-way**

IHO Definition: Traffic flow in two generally opposite directions.

INT 1 Reference: NOT SPECIFIED

15.6.1 Fairways

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

Geo feature: Fairway (**FAIRWY**)

Attributes:

DATEND	DATSTA				
DRVAL1 -	minimum depth in the fairway				
NOBJNM	OBJNAM	ORIENT	QUASOU	RESTRN	SOUACC
STATUS	TRAFIC	INFORM	NINFOM	NTXTDS	SCAMIN
TXTDSC	RECDAT	RECIND	SORDAT	SORIND	

Remarks:

- A collection feature **C_AGGR** or **C_ASSO** (see clause XX) should be created to relate a fairway with associated navigational aids, recommended tracks, dredged areas and other regulated areas.
- Where beacon or buoys marking a fairway are offset from the actual fairway limits, this should be indicated using the attribute INFORM on the **FAIRWY** feature.

Distinction: Deep water route centreline; deep water route part; traffic separation scheme lane part.

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, Edition 5; 4448).

The recommended route centreline indicates the "centreline" of a recommended route. (S-57, Appendix A – Chapter 1, Edition 3.1, Page 1.137, November 2000).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**RCRTCL** (L)	CATTRK (M) Category of recommended track	1 : based on a system of fixed marks 2 : not based on a system of fixed marks	E
		DRVAL1 (O) Depth range value 1	Unit: Defined in the DUNI subfield of the DSPM record or the DUNITS attribute of the M_UNIT meta feature: metre Resolution: 0·1m Format: sxxxxx.x s: sign, negative values only Example: **50** for a minimum depth of 50 metres	F
		ORIENT (O) Orientation	Unit: Degree (°) – minimum value 0; maximum value 360 Resolution: 0·01° Format: xxx.xX Example: **246.7** for an orientation of 246·7 degrees	F
		QUASOU (O) Quality of sounding measurement	1 : depth known ~~2 : 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~~	L
		RESTRN (O) Restriction	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted ~~7 : entry prohibited~~	L

			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 artifacts prohibited~~ ~~23 : cargo transhipment (lightering) prohibited~~ ~~24 : dragging prohibited~~ 25 : stopping prohibited ~~26 : landing prohibited~~ 27 : speed restricted ~~28 : swimming prohibited~~	
		STATUS (O) 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	L
		TECSOU (O) Technique of sounding measurement	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	L

Comment [j173]: S-57 Extension 06/01.

Comment [j174]: S-57 Extension 06/01.

			~~10 : photogrammetry~~ ~~11 : satellite imagery~~ ~~12 : found by leveling~~ ~~13 : swept by side-scan sonar~~ ~~14 : computer generated~~	
		TRAFIC (O) Traffic flow	1 : inbound 2 : outbound 3 : one-way 4 : two-way	E

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.

Comment [j175]: 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 series of structures or features in line.

Depth range value 1: IHO Definition: The minimum (shoalest) value of a depth range.

Remarks:

- Where the area dries, the value is negative.

Comment [j176]: S-57 App A, Ch 2 – 2.124.

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).

Traffic flow: IHO Definition:

1) **Inbound**

IHO Definition: Traffic flow in a general direction toward a port or similar destination.

2) **Outbound**

IHO Definition: Traffic flow in a general direction away from a port or similar point of origin.

3) **One-way**

IHO Definition: Traffic flow in one general direction only.

4) **Two-way**

IHO Definition: Traffic flow in two generally opposite directions.

INT 1 Reference: M 28.1

15.7.1 Recommended routes (see S-4 – B-435.4)

If it is required to encode the centreline of a recommended route, it must be done using the feature **RCRTCL**.

Geo feature: Recommended route centreline (**RCRTCL**)
Attributes: CATTRK DATEND DATSTA
DRVAL1 - minimum depth
NOBJNM OBJNAM ORIENT PEREND PERSTA QUASOU

SOUACC	STATUS	TECSOU	TRAFIC	INFORM	NINFOM
NTXTDS	SCAMIN	TXTDSC	RECDAT	RECIND	SORDAT
SORIND					

Remarks:

- When the traffic flow is one way (attribute TRAFIC = *3*), the direction of digitising must be the same as the direction of traffic flow. This is to ensure the correct representation in the ECDIS of the direction to be followed.

Distinction: Recommended traffic lane part; recommended track.

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, Edition 5; 5712).

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, Appendix A – Chapter 1, Edition 3.1, Page 1.93, November 2000).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**TWRTPT** (A)	CATTRK (O) Category of recommended track	1 : based on a system of fixed marks 2 : not based on a system of fixed marks	E
		DRVAL1 (O) Depth range value 1	Unit: Defined in the DUNI subfield of the DSPM record or the DUNITS attribute of the M_UNIT meta feature: metre Resolution: 0·1m Format: sxxxxx.x s: sign, negative values only Example: **50** for a minimum depth of 50 metres	F
		ORIENT (M) Orientation	Unit: Degree (°) – minimum value 0; maximum value 360 Resolution: 0·01° Format: xxx.xX Example: **246.7** for an orientation of 246·7 degrees	F
		QUASOU (O) Quality of sounding measurement	1 : depth known ~~2 : 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~~	L
		STATUS (O) Status	~~1 : permanent~~ ~~2 : occasional~~ 3 : recommended 4 : not in use ~~5 : periodic/intermittent~~ ~~6 : reserved~~ ~~7 : temporary~~	L

			~~8 : private~~ 9 : mandatory ~~11 : extinguished~~ ~~12 : illuminated~~ ~~13 : historic~~ ~~14 : public~~ ~~15 : synchronized~~ ~~16 : watched~~ ~~17 : un-watched~~ ~~18 : existence doubtful~~ 19 : buoyed	
		TECSOU (O) Technique of sounding measurement	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~~	L
		TRAFIC (M) Traffic flow	1 : inbound 2 : outbound 3 : one-way 4 : two-way	E

Comment [j177]: S-57 Extension 06/01.

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.

Comment [j178]: 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 series of structures or features in line.

Depth range value 1: IHO Definition: The minimum (shoalest) value of a depth range.

Remarks:

- Where the area dries, the value is negative.

Comment [j179]: S-57 App A, Ch 2 – 2.124.

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).

Traffic flow: IHO Definition:

1) **Inbound**

   IHO Definition: Traffic flow in a general direction toward a port or similar destination.

2) **Outbound**

   IHO Definition: Traffic flow in a general direction away from a port or similar point of origin.

3) **One-way**

   IHO Definition: Traffic flow in one general direction only.

4) **Two-way**

   IHO Definition: Traffic flow in two generally opposite directions.

INT 1 Reference: M 28.2

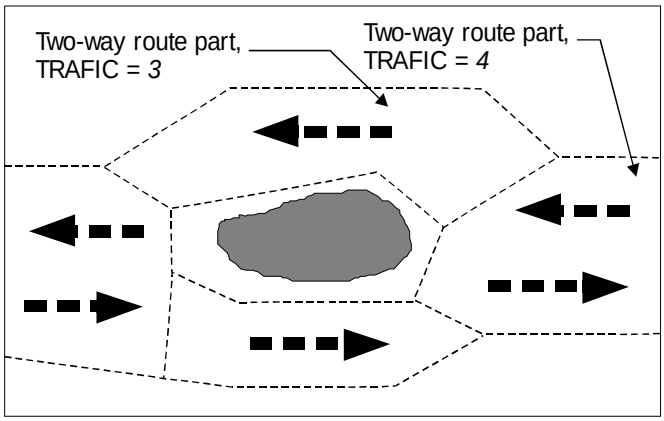
15.8.1 Two-way Routes (see S-4 – B-435.6)

A two-way route consists of one or more areas within which traffic flows in two directions along one bearing and its reciprocal. When it is required to encode these areas, this must be done using the feature **TWRTPT**. These route parts will generally be two-way, but some may be restricted to one-way traffic flow.

Geo feature: Two-way routes (**TWRTPT**)

Attributes:

CATTRK	DATEND	DATSTA			
DRVAL1 -	minimum depth				
ORIENT	QUASOU	SOUACC	STATUS	TECSOU	TRAFIC
INFORM	NINFOM	NTXTDS	SCAMIN	TXTDSC	RECDAT
RECIND	SORDAT	SORIND			



One-way traffic flow in a two-way route

If it is required to encode a two-way route with one-way sections, separate **TWRTPT** features must be encoded for the different parts, with attribute TRAFIC = *3* (one-way) or *4* (two-way). In one-way sections, the attribute ORIENT must indicate the true direction of traffic flow, not its reciprocal. In two-way sections, ORIENT may indicate either direction of traffic flow.

Remarks:

- The orientation of the two-way route is defined by its centreline and is related to the general direction of the two-way route.

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**. An optional part of an IMO adopted routing measure…. 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 minimize head-on encounters.(…) (IHO Chart Specifications, S-4).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol*	**RCTLPT** (P, A)	ORIENT (M) Orientation	Unit: Degree (°) – minimum value 0; maximum value 360 Resolution: 0·01° Format: xxx.xX Example: **246.7** for an orientation of 246·7 degrees	F
ECDIS Symbol		STATUS (O) 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	L

Comment [j180]: S-57 Extension 06/01.

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).

INT 1 Reference: M 26.1-2

15.9.1 Recommended traffic lane part (see S-4 – B-435.5)

The feature **RCTLPT** should be used to encode areas with a recommended direction of traffic flow:

- between two TSS (INT1 - M26.1);
- in the entrance area of a TSS;
- along the outside of a deep water route (INT1 - M26.2).

Geo feature: Recommended traffic lane part (**RCTLPT**)

Attributes: DATEND DATSTA ORIENT STATUS INFORM NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND SORDAT SORIND

Remarks:

- When the area is not defined, a point object should be encoded.
- The orientation of the recommended traffic lane part is defined by its centreline and is related to the general direction of the recommended traffic lane part.

Distinction:

15.10 Traffic separation scheme lane part

IHO Definition: **TRAFFIC SEPARATION SCHEME**. 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, Edition 5; 5585).

A traffic lane is an area within defined limits in which one-way traffic flow is established. (IMO Ships Routing, 6th Edition).

A traffic separation scheme lane part is an area of a traffic lane in which the direction of flow of traffic is uniform. (S-57, Appendix A – Chapter 1, Edition 3.1, Page 1.187, November 2000).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**TSSLPT** (A)	CATTSS (O) Category of traffic separation scheme	1 : IMO – adopted 2 : not IMO – adopted	E
		ORIENT (m) Orientation	Unit: Degree (°) – minimum value 0; maximum value 360 Resolution: 0·01° Format: xxx.xX Example: **246.7** for an orientation of 246·7 degrees	F
		RESTRN (O) Restriction	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 artifacts prohibited~~ ~~23 : cargo transhipment (lightering) prohibited~~	L

			~~24 : dragging prohibited~~ 25 : stopping prohibited ~~26 : landing prohibited~~ 27 : speed restricted ~~28 : swimming prohibited~~	
		STATUS (O) 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	L

Comment [j181]: S-57 Extension 06/01.

Comment [j182]: S-57 Extension 06/01.

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.

2) **Not IMO - adopted**

   IHO Definition: a defined Traffic Separation Scheme that has not been adopted as an IMO routing measure.

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).

INT 1 Reference: M 20.1, 20.2

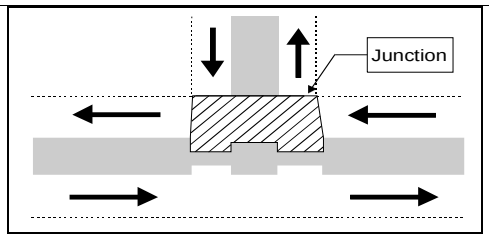
15.10.1 Traffic separation scheme lanes (see S-4 – B-435.1)

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 **TSSLPT**.

Geo feature: Traffic separation scheme lane part (**TSSLPT**)
Attributes: CATTSS DATEND DATSTA
ORIENT - direction of the traffic flow
RESTRN STATUS INFORM NINFOM NTXTDS SCAMIN
TXTDSC RECDAT RECIND SORDAT SORIND

Remarks:

- At junctions, other than crossings and roundabouts, a separate **TSSLPT** feature must be encoded. For this feature, the attribute ORIENT 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 attribute INFORM or TXTDSC.



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 SCHEME**. 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, Edition 5; 5585).

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, 6th Edition).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol*	**TSEZNE** (A)	CATTSS (O) Category of traffic separation scheme	1 : IMO – adopted 2 : not IMO – adopted	E
ECDIS Symbol		STATUS (O) 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	L

Comment [j183]: S-57 Extension 06/01.

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.

2) **Not IMO - adopted**

   IHO Definition: a defined Traffic Separation Scheme that has not been adopted as an IMO routing measure.

INT 1 Reference: M 13, 20.1, 20.2, 20.3

15.11.1 Traffic separation zones (see S-4 – B-435.1)

The feature **TSEZNE** 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.

Geo feature: Traffic separation zone (**TSEZNE**)
Attributes: CATTSS DATEND DATSTA STATUS INFORM NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND SORDAT SORIND

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**. 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, Edition 5; 5585).

The boundary of a traffic separation scheme is the outer limit of a traffic lane part or a traffic separation scheme roundabout. (S-57, Appendix A – Chapter 1, Edition 3.1, Page 1.185, November 2000).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol*	**TSSBND** (L)	CATTSS (O) Category of traffic separation scheme	1 : IMO – adopted 2 : not IMO – adopted	E
ECDIS Symbol		STATUS (O) 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	L

Comment [j184]: S-57 Extension 06/01.

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.

2) **Not IMO - adopted**

   IHO Definition: a defined Traffic Separation Scheme that has not been adopted as an IMO routing measure.

INT 1 Reference: M 20.1, 20.2

15.12.1 Traffic separation scheme boundaries (see S-4 – B-435.1)

The feature **TSSBND** must only be used to encode the outer limits of traffic lanes or traffic separation scheme roundabouts.

Geo feature: Traffic separation scheme boundary (**TSSBND**)

Attributes: CATTSS DATEND DATSTA STATUS INFORM NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND SORDAT SORIND

Remarks:

Distinction: Traffic separation line; traffic separation scheme crossing; traffic separation scheme lane part; traffic separation scheme roundabout; traffic separation zone.

15.13 Precautionary area

IHO Definition: **PRECAUTIONARY AREA**. 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, Edition 5; 3982).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World	**PRCARE** (P, A)	INFORM (m) Information		S
Paper Chart Symbol *ECDIS Symbol*		RESTRN (O) Restriction	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 artifacts prohibited~~ ~~23 : cargo transhipment (lightering) prohibited~~ ~~24 : dragging prohibited~~ 25 : stopping prohibited ~~26 : landing prohibited~~ 27 : speed restricted ~~28 : swimming prohibited~~	L
		STATUS (O) Status	~~1 : permanent~~ ~~2 : occasional~~ 3 : recommended 4 : not in use ~~5 : periodic/intermittent~~ ~~6 : reserved~~ ~~7 : temporary~~ ~~8 : private~~ 9 : mandatory ~~11 : extinguished~~	L

Comment [j185]: S-57 Extension 06/01.

			~~12 : illuminated~~ ~~13 : historic~~ ~~14 : public~~ ~~15 : synchronized~~ ~~16 : watched~~ ~~17 : un-watched~~ ~~18 : existence doubtful~~ 19 : buoyed	
		TXTDSC (m) Textual description		S

Comment [j186]: S-57 Extension 06/01.

Information: IHO Definition: Textual information about the feature.

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 INFORM. If formatted text is required, then the attribute TXTDSC must be used.

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 TXTDSC.

Comment [j187]: MD8 – 1.Cl.22 and 1.Co.15.

INT 1 Reference: M 16, 24

15.13.1 Precautionary areas (see S-4 – B-435.2)

The feature **PRCARE** 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.

Geo feature: Precautionary areas (**PRCARE**)

Attributes:						
	DATEND	DATSTA	RESTRN	STATUS	INFORM	NINFOM
	NTXTDS	SCAMIN	TXTDSC	RECDAT	RECIND	SORDAT
	SORIND					

Remarks:
- A **PRCARE** feature may overlap other features encoded for the traffic separation scheme (e.g. **TSSRON**, **TSSLPT, TSSCRS**).

Distinction: Caution area; inshore traffic zone; restricted area; all traffic separation scheme elements.

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, Edition 5; 1280).

The deep water route centreline indicates the centreline of a route, the width of which is not explicitly defined. (S-57, Appendix A – Chapter 1, Edition 3.1, Page 1.49, November 2000).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**DWRTCL** (P, A)	CATTRK (M) Category of recommended track	1 : based on a system of fixed marks 2 : not based on a system of fixed marks	E
		DRVAL1 (O) Depth range value 1	Unit: Defined in the DUNI subfield of the DSPM record or the DUNITS attribute of the M_UNIT meta feature: metre Resolution: 0·1m Format: sxxxxx.x s: sign, negative values only Example: **50** for a minimum depth of 50 metres	F
		ORIENT (M) Orientation	Unit: Degree (°) – minimum value 0; maximum value 360 Resolution: 0·01° Format: xxx.xX Example: **246.7** for an orientation of 246·7 degrees	F
		QUASOU (O) Quality of sounding measurement	1 : depth known ~~2 : 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~~	L
		STATUS (O) Status	~~1 : permanent~~ ~~2 : occasional~~ 3 : recommended 4 : not in use ~~5 : periodic/intermittent~~ ~~6 : reserved~~ ~~7 : temporary~~	L

			~~8 : private~~ 9 : mandatory ~~11 : extinguished~~ ~~12 : illuminated~~ ~~13 : historic~~ ~~14 : public~~ ~~15 : synchronized~~ ~~16 : watched~~ ~~17 : un-watched~~ ~~18 : existence doubtful~~ 19 : buoyed	
		TECSOU (O) Technique of sounding measurement	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~~	L
		TRAFIC (M) Traffic flow	1 : inbound 2 : outbound 3 : one-way 4 : two-way	E

Comment [j188]: S-57 Extension 06/01.

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.

Comment [j189]: 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 series of structures or features in line.

Depth range value 1: IHO Definition: The minimum (shoalest) value of a depth range.

Remarks:

- Where the area dries, the value is negative.

Comment [j190]: S-57 App A, Ch 2 – 2.124.

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).

Traffic flow: IHO Definition:

1) **Inbound**

   IHO Definition: Traffic flow in a general direction toward a port or similar destination.

2) **Outbound**

   IHO Definition: Traffic flow in a general direction away from a port or similar point of origin.

3) **One-way**

   IHO Definition: Traffic flow in one general direction only.

4) **Two-way**

   IHO Definition: Traffic flow in two generally opposite directions.

INT 1 Reference: M 27.3

15.14.1 Deep water routes centrelines

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 **DWRTCL**.

Geo feature: Deep water route centreline (**DWRTCL**)

Attributes:

CATTRK	DATEND	DATSTA			
DRVAL1 -	minimum depth				
NOBJNM					
OBJNAM -	should only be used if the individual object is not aggregated in a collection object				
ORIENT	QUASOU	RESTRN	SQUACC	STATUS	TECSOU
TRAFIC	INFORM	NINFOM	NTXTDS	SCAMIN	TXTDSC
RECDAT	RECIND	SORDAT	SORIND		

Remarks:

- When the traffic flow is one way (attribute TRAFIC = *3*), the direction of digitising must be the same as the direction of traffic flow. This is to ensure the correct representation in the ECDIS of the direction to be followed.

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, Edition 5; 1280).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**DWRTPT** (A)	DRVAL1 (M) Depth range value 1	Unit: Defined in the DUNI subfield of the DSPM record or the DUNITS attribute of the M_UNIT meta feature: metre Resolution: 0·1m Format: sxxxxx.x s: sign, negative values only Example: **50** for a minimum depth of 50 metres	F
		ORIENT (M) Orientation	Unit: Degree (°) – minimum value 0; maximum value 360 Resolution: 0·01° Format: xxx.xX Example: **246.7** for an orientation of 246·7 degrees	F
		QUASOU (O) Quality of sounding measurement	1 : depth known ~~2 : 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~~	L
		RESTRN (O) Restriction	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~~	L

			~~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 artifacts prohibited~~ ~~23 : cargo transhipment (lightering) prohibited~~ ~~24 : dragging prohibited~~ ~~25 : stopping prohibited~~ ~~26 : landing prohibited~~ 27 : speed restricted ~~28 : swimming prohibited~~	
		STATUS (O) 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	L
		TECSOU (O) Technique of sounding measurement	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~~	L

Comment [j191]: S-57 Extension 06/01.

Comment [j192]: S-57 Extension 06/01.

			~~14 : computer generated~~	
		TRAFIC (M) Traffic flow	1 : inbound 2 : outbound 3 : one-way 4 : two-way	E

Depth range value 1: IHO Definition: The minimum (shoalest) value of a depth range.

Remarks:

- Where the area dries, the value is negative.

Comment [j193]: S-57 App A, Ch 2 – 2.124.

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).

Traffic flow: IHO Definition:

1) **Inbound**

   IHO Definition: Traffic flow in a general direction toward a port or similar destination.

2) **Outbound**

   IHO Definition: Traffic flow in a general direction away from a port or similar point of origin.

3) **One-way**

   IHO Definition: Traffic flow in one general direction only.

4) **Two-way**

   IHO Definition: Traffic flow in two generally opposite directions.

INT 1 Reference: M 27.1-2

15.15.1 Deep water route parts (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 these areas, this must be done using the feature **DWRTPT**.

Geo feature: Deep water route centreline (**DWRTPT**)
Attributes: DATEND DATSTA
DRVAL1 - minimum depth
NOBJNM
OBJNAM - should only be used if the individual feature is not aggregated in a collection feature
ORIENT - direction of the traffic flow
QUASOU RESTRN SQUACC STATUS TECSOU TRAFIC
INFORM NINFOM NTXTDS SCAMIN TXTDSC RECDAT
RECIND SORDAT SORIND

Remarks:

- The route must be covered by **DEPARE** features.
- A deep water route part may overlap a **TSSLPT** feature.
- To encode a complete deep water route, the **DWRTCL**, **DWRTPT** 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 XX). The attribute OBJNAM on the **C_AGGR** feature is used to encode the name of the DW, and the attribute INFORM or TXTDSC should be used to encode textual information about the whole DW.

Distinction: Deep water route centerline; 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, Edition 5; 5585).

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, 6th Edition).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol*	**TSELNE** (L)	CATTSS (O) Category of traffic separation scheme	1 : IMO – adopted 2 : not IMO – adopted	E
ECDIS Symbol		STATUS (O) 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	L

Comment [j194]: S-57 Extension 06/01.

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.

2) **Not IMO - adopted**

   IHO Definition: a defined Traffic Separation Scheme that has not been adopted as an IMO routing measure.

INT 1 Reference: M 12

15.16.1 Traffic separation line (see S-4 – B-435.1)

The feature **TSELNE** must only be used to encode the common boundary of two traffic lanes, or of one traffic lane and one inshore traffic zone.

Geo feature: Traffic separation line (**TSELNE**)
Attributes: CATTSS DATEND DATSTA STATUS INFORM NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND SORDAT SORIND

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

IHO Definition: **INSHORE TRAFFIC ZONE**. 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 as Sea. (IHO Dictionary – S-32, Edition 5; 2457).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol*	**ISTZNE** (L)	CATTSS (O) Category of traffic separation scheme	1 : IMO – adopted 2 : not IMO – adopted	E
ECDIS Symbol		RESTRN (O) Restriction	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 artifacts prohibited~~ ~~23 : cargo transhipment (lightering) prohibited~~ ~~24 : dragging prohibited~~ ~~25 : stopping prohibited~~ ~~26 : landing prohibited~~ 27 : speed restricted ~~28 : swimming prohibited~~	L
		STATUS (O) Status	~~1 : permanent~~ ~~2 : occasional~~ 3 : recommended 4 : not in use ~~5 : periodic/intermittent~~ ~~6 : reserved~~	L

Comment [j195]: S-57 Extension 06/01.

			~~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	

Comment [j196]: S-57 Extension 06/01.

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.

2) **Not IMO - adopted**

   IHO Definition: a defined Traffic Separation Scheme that has not been adopted as an IMO routing measure.

INT 1 Reference: M 25.2

15.17.1 Inshore traffic zones (see S-4 – B-435.1)

The feature **ISTZNE** must only be used to encode the designated area between the landward boundary of a traffic separation scheme and the adjacent coats.

Geo feature: Inshore traffic zone (**ISTZNE**)

Attributes:

CATTSS	DATEND	DATSTA	RESTRN	STATUS	INFORM
NINFOM	NTXTDS	SCAMIN	TXTDSC	RECDAT	RECIND
SORDAT	SORIND				

Remarks:

Distinction: Traffic separation scheme crossing; traffic separation scheme lane part; traffic separation scheme roundabout; traffic separation zone; precautionary area.

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, Edition 5; 5585).

A traffic separation scheme crossing is a defined area where traffic lanes cross. (S-57, Appendix A – Chapter 1, Edition 3.1, Page 1.186, November 2000).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol*	**TSSCRS** (A)	CATTSS (O) Category of traffic separation scheme	1 : IMO – adopted 2 : not IMO – adopted	E
ECDIS Symbol		RESTRN (O) Restriction	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 artifacts prohibited~~ ~~23 : cargo transhipment (lightering) prohibited~~ ~~24 : dragging prohibited~~ ~~25 : stopping prohibited~~ ~~26 : landing prohibited~~ 27 : speed restricted ~~28 : swimming prohibited~~	L
		STATUS (O) Status	~~1 : permanent~~ ~~2 : occasional~~ 3 : recommended 4 : not in use ~~5 : periodic/intermittent~~	L

Comment [j197]: S-57 Extension 06/01.

			~~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	

Comment [j198]: S-57 Extension 06/01.

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.

2) **Not IMO - adopted**

   IHO Definition: a defined Traffic Separation Scheme that has not been adopted as an IMO routing measure.

INT 1 Reference: M 23

15.18.1 Traffic separation scheme crossing (see S-4 – B-435.1)

The feature **TSSCRS** must only be used to encode the area where at least four traffic lanes cross.

Geo feature: Inshore traffic zone (**TSSCRS**)

Attributes: CATTSS DATEND DATSTA RESTRN STATUS INFORM NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND SORDAT SORIND

Remarks:

- Junctions other than crossings and roundabouts should be encoded using the feature **TSSLPT** (see clauses X.X and X.X)
- A **TSSCRS** feature must not overlap a **TSEZNE** feature at its centre.

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, Edition 5; 5585).

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, Edition 5; 4448).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol*	**TSSRON** (A)	CATTSS (O) Category of traffic separation scheme	1 : IMO – adopted 2 : not IMO – adopted	E
ECDIS Symbol		RESTRN (O) Restriction	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 artifacts prohibited~~ ~~23 : cargo transhipment (lightering) prohibited~~ ~~24 : dragging prohibited~~ ~~25 : stopping prohibited~~ ~~26 : landing prohibited~~ 27 : speed restricted ~~28 : swimming prohibited~~	L
		STATUS (O) Status	~~1 : permanent~~ ~~2 : occasional~~ 3 : recommended 4 : not in use ~~5 : periodic/intermittent~~	L

Comment [j199]: S-57 Extension 06/01.

			~~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	

Comment [j200]: S-57 Extension 06/01.

Category of traffic separation scheme: IHO Definition:

3) **IMO - adopted**

IHO Definition: a defined Traffic Separation Scheme that has been adopted as an IMO routing measure.

4) **Not IMO - adopted**

IHO Definition: a defined Traffic Separation Scheme that has not been adopted as an IMO routing measure.

INT 1 Reference: M 21

Traffic separation scheme roundabout (see S-4 – B-435.1)

The feature **TSSRON** must only be used to encode the area in which traffic moves in a counter clockwise direction around a specified point or zone.

Geo feature: Traffic separation scheme roundabout (**TSSRON**)

Attributes: CATTSS DATEND DATSTA RESTRN STATUS INFORM NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND SORDAT SORIND

Remarks:

- A **TSSRON** feature must not overlap a **TSEZNE** feature at its centre.

Distinction: Traffic separation line; traffic separation scheme boundary; traffic separation scheme crossing; traffic separation scheme lane part; traffic separation zone.

15.20 Archipelagic Sea Lane

Comment [j201]: S-57 Supplement No. 2.

IHO Definition: **ARCHIPELAGIC SEA LANE**. 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 M-4 B-435.10, S-51 Appendix 2 Part II).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World	**ARCSLN** (A)	NATION (M) Nationality	The nationality is encoded by a 2 character code following ISO 3166 (refer to S-57 Appendix A).	A
Paper Chart Symbol *ECDIS Symbol*		OBJNAM (O) Object name		S

Nationality: IHO Definition:

Remarks:
- The attribute "nationality" indicates the nationality of the specific feature.

Object name: IHO Definition: The individual name of an object.

INT 1 Reference: M 17

15.20.1 Archipelagic Sea Lane (see S-4 – B-435.10)

If it is required to encode an Archipelagic Sea Lane, it must be done using **ARCSLN** and/or **ASLXIS** (see clause X.X) features, and possibly navigational aids objects.

The unique character of Archipelagic Sea Lanes (ASLs) is specified by UNCLOS Article 53 and Part H, General Provision of IMO Ships Routing.

The encoding of relationships between these features is defined in clause X.X.

Geo feature: Archipelagic Sea Lane (**ARCSLN**)
Attributes: DATEND DATSTA NATION NOBJNM OBJNAM INFORM NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND SORDAT SORIND

Remarks:
- The feature Archipelagic Sea Lane encodes the area of an Archipelagic Sea Lane.
- In some cases only accurate information on the axes (**ASLXIS**) may be available and in such cases the extents of the ASL (**ARCSLN**) may not be able to be encoded.
- To encode an Archipelagic Sea Lane (ASL) system, the **ARCSLN, ASLXIS** 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). The attribute OBJNAM for the **C_AGGR** feature may be used to encode the name of the ASL (if applicable).

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

Comment [j202]: S-57 Supplement No. 2.

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.

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".

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World	**ASLXIS** (L)	NATION (M) Nationality	The nationality is encoded by a 2 character code following ISO 3166 (refer to S-57 Appendix A).	A
Paper Chart Symbol *ECDIS Symbol*		OBJNAM (O) Object name		S

Nationality: IHO Definition:

Remarks:
- The attribute "nationality" indicates the nationality of the specific feature.

Object name: IHO Definition: The individual name of an object.

INT 1 Reference: M 17

15.21.1 Archipelagic Sea Lane Axis (see S-4 – B-435.10)

The feature **ASLXIS** must only be used to encode the axes defining an Archipelagic Sea Lane.

Geo feature: Archipelagic Sea Lane (**ASLXIS**)
Attributes: DATEND DATSTA NATION NOBJNM OBJNAM INFORM
NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND
SORDAT SORIND

Remarks:
- To encode an Archipelagic Sea Lane (ASL) system, the **ARCSLN, ASLXIS** 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). The attribute OBJNAM for the **C_AGGR** feature may be used to encode the name of the ASL (if applicable).

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**. Also called radio reporting points, they 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. (Adapted from IHO Chart Specifications, S-4).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World	**RDOCAL** (P, L)	CALSGN (O) Call sign		S
Paper Chart Symbol		COMCHA (O) Communication channel	See below for description and example of formatted string value	A
ECDIS Symbol		ORIENT (M) Orientation	Unit: Degree (°) – minimum value 0; maximum value 360 Resolution: 0·01° Format: xxx.xX Example: **246.7** for an orientation of 246·7 degrees	F
		STATUS (O) 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~~	L
		TRAFIC (M) Traffic flow	1 : inbound 2 : outbound ~~3 : one-way~~ 4 : two-way	E

Call sign: IHO Definition: The designated call-sign of a radio station, pilot, ...

Communication channel: IHO Definition: A channel number assigned to a specific radio frequency, frequencies or frequency band

Expected input: Enter specific VHF-Channel.

Indication: Each VHF-Channel should be indicated by 2 digits and up to 2 characters (A-Z).

Comment [j203]: S-57 Extension 06/01.

Comment [j204]: S-57 Extension 06/01.

Comment [j205]: MD8 – 5.Co.1.

Format: [XXXX];[XXXX];….

Example: **07** for VHF-Channel 7

Remarks:
- The attribute "communication channel" encodes the various VHF-Channels used for communication.
- The indication of several VHF-Channels is possible.

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).

Traffic flow: IHO Definition:

1) **Inbound**

   IHO Definition: Traffic flow in a general direction toward a port or similar destination.

2) **Outbound**

   IHO Definition: Traffic flow in a general direction away from a port or similar point of origin.

3) **One-way**

   IHO Definition: Traffic flow in one general direction only.

4) **Two-way**

   IHO Definition: Traffic flow in two generally opposite directions.

INT 1 Reference: M 40

15.22.1 Radio reporting (calling-in) points (see S-4 – B-488)

If it is required to encode a radio reporting point or line, it must be done using the feature **RDOCAL**.

Geo feature: Radio calling-in point (**RDOCAL**)

Attributes:
COMCHA DATEND DATSTA NOBJNM
OBJNAM - e.g. alphanumeric designator
ORIENT - orientation of the traffic flow at that point
PEREND PERSTA STATUS TRAFIC
INFORM - notes; for example, if the requirement to report by radio relates to certain classes of vessels only. The attribute TXTDSC may be used instead of INFORM, or for longer explanations or notes
NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND
SORDAT SORIND

Remarks:
- Each **RDOCAL** feature must only carry one orientation. If it is required to encode the reciprocal orientation, to indicate that a bearing and its opposite apply to a **RDOCAL** feature, it must be done using attribute TRAFIC = *4* (two-way). If the same position is used for another orientation (not opposite) of traffic flow, an additional **RDOCAL** feature must be created.
- **RDOCAL** features of type line should be digitised such that the traffic direction that is required to report is to the right.

Distinction: Radio station; pilot boarding place.

15.23 Ferry route

IHO Definition: **FERRY ROUTE**. A route in a body of water where a ferry crosses from one shoreline to another. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World	**FERYRT** (L, A)	CATFRY (M) Category of ferry	1 : "free-moving" ferry 2 : cable ferry 3 : ice ferry	L
Paper Chart Symbol *ECDIS Symbol*		STATUS (O) 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~~	L

Comment [j206]: S-57 Extension 06/01.

Category of ferry route: IHO Definition:

1) **"Free moving" ferry**

   IHO Definition: A ferry which may have routes that vary with weather, tide and traffic. (adapted from S-4).

2) **Cable ferry**

   IHO Definition: A ferry that follows a fixed route guided by a cable. (adapted from IHO Specifications, S-4).

3) **Ice ferry**

   IHO Definition: A winter-time ferry which crosses a lead. (Finnish Maritime Administration).

INT 1 Reference: M 50, 51

15.23.1 Ferries (see S-4 – B-438)

If it is required to encode a ferry route, it must be done using the feature **FERYRT**.

Geo feature: Ferry route (**FERYRT**)

Attributes:						
	CATFRY	DATEND	DATSTA	NOBJNM	OBJNAM	PEREND
	PERSTA	STATUS	INFORM	NINFOM	NTXTDS	SCAMIN
	TXTDSC	RECDAT	RECIND	SORDAT	SORIND	

Remarks:

- The attribute "category of ferry" does not encode the various types of ferry vessel, but the maneuverability 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.

Distinction:

15.24 Radar line

IHO Definition: **RADAR LINE**. 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, Edition 5; 4146).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol*	**RADLNE** (L)	ORIENT (M) Orientation	Unit: Degree (°) – minimum value 0; maximum value 360 Resolution: 0·01° Format: xxx.xX Example: **246.7** for an orientation of 246·7 degrees	F
ECDIS Symbol		STATUS (O) 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~~	L

Comment [j207]: S-57 Extension 06/01.

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).

INT 1 Reference: M 32.1-32.2

15.24.1 Radar reference lines (see S-4 – B-487.2)

If it is required to encode a radar reference line, it must be done using the feature **RADLNE**.

Geo feature: Radar line (**RADLNE**)
Attributes: NOBJNM OBJNAM
ORIENT - value of the bearing from seaward
STATUS INFORM NINFOM NTXTDS SCAMIN TXTDSC
RECDAT RECIND SORDAT SORIND

Remarks:

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. (S-57, Appendix A – Chapter 1, Edition 3.1, Page 1.128, November 2000).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World	**RADRNG** (A)	COMCHA (O) Communication channel		S
Paper Chart Symbol *ECDIS Symbol*		STATUS (O) 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~~	L

Comment [j208]: S-57 Extension 06/01.

Communication channel: IHO Definition: A channel number assigned to a specific radio frequency, frequencies or frequency band

Expected input: Enter specific VHF-Channel.

Indication: Each VHF-Channel should be indicated by 2 digits and up to 2 characters (A-Z).

Format: [XXXX];[XXXX];….

Example: **07** for VHF-Channel 7

Remarks:
- The attribute "communication channel" encodes the various VHF-Channels used for communication.
- The indication of several VHF-Channels is possible.

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 **RADRNG**.

Geo feature: Radar ranges (**RADRNG**)
Attributes: COMCHA DATEND DATSTA NOBJNM OBJNAM STATUS INFORM NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND SORDAT SORIND

Remarks:

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, 2nd Edition).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World  Radar Station *Photograph, courtesy of the Pacific Hydrographic Branch* *Paper Chart Symbol* *ECDIS Symbol*	**RADSTA** (P)	CALSGN (O) Call sign		S
		CATRAS (O) Category of radar station	1 : radar surveillance station 2 : coast radar station	L
		COMCHA (O) Communication channel		S
		STATUS (O) 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~~	L
		VALMXR (O) Value of maximum range	Unit: Nautical mile (M) Resolution: 0·1M Format: xx.x Example: **17** for maximum range of 17 nautical miles	F

Call sign: IHO Definition:

Category of radar station: IHO Definition:

1) **Radar surveillance station**

   IHO Definition: A radar station established for traffic surveillance. (IHO Dictionary – S-32, Edition 5; 4144)

2) **Coast radar station**

   IHO Definition: A shore-based station which the mariner can contact by radio to obtain a position. IHO

Comment [j209]: S-57 Extension 06/01.

Comment [j210]: MD8 – 5.Co.3

Comment [j211]: S-57 Extension 06/01.

Chart Specifications, S-4.

Communication channel: IHO Definition: A channel number assigned to a specific radio frequency, frequencies or frequency band

Expected input: Enter specific VHF-Channel.

Indication: Each VHF-Channel should be indicated by 2 digits and up to 2 characters (A-Z).

Format: [XXXX];[XXXX];….

Example: **07** for VHF-Channel 7

Remarks:
- The attribute "communication channel" encodes the various VHF-Channels used for communication.
- The indication of several VHF-Channels is possible.

Value of maximum range: IHO Definition: The extreme distance at which an object can be seen or a signal detected.

Remarks:
- This attribute does not apply to lights where the attribute "value of nominal range" should be used.

INT 1 Reference: M 30

15.26.1 Radar station (see S-4 – B-487.3)

If it is required to encode a radar station, it must be done using the feature **RADSTA**.

Geo feature: Radar ranges (**RADSTA**)

Attributes: CATRAS COMCHA DATEND PEREND PERSTA
HEIGHT - height of the emitting part of the radar
NOBJNM OBJNAM STATUS VALMXR INFORM NINFOM
NTXTDS SCAMIN TXTDSC RECDAT RECIND SORDAT
SORIND

Comment [j212]: S-57 Supplement No. 2.

Remarks:
- The **RADSTA** 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. **BUISGL**, **LNDMRK**).

Distinction: Radar line; radar range; radar transponder beacon.

16 Areas, limits

16.1 Anchorage area

IHO Definition: **ANCHORAGE AREA**. An area in which vessels anchor or may anchor. (IHO Dictionary – S-32, Edition 5; 130).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**ACHARE** (P, A)	CATACH (O) Category of anchorage	1 : unrestricted anchorage 2 : deep water anchorage 3 : tanker anchorage 4 : explosives anchorage 5 : quarantine anchorage 6 : sea-plane 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	L
		RESTRN (O) Restriction	~~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 artifacts prohibited~~ ~~23 : cargo transhipment (lightering) prohibited~~ ~~24 : dragging prohibited~~ ~~25 : stopping prohibited~~ ~~26 : landing prohibited~~ 27 : speed restricted	L

			28 : swimming prohibited	
		STATUS (O) 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~~	L

Comment [j213]: S-57 Extension 06/01.

Comment [j214]: S-57 Extension 06/01.

Category of anchorage: IHO Definition:

1) **Unrestricted anchorage**

   IHO Definition: An area in which vessels anchor or may anchor. (IHO Dictionary – S-32, Edition 5; 130).

2) **Deep water anchorage**

   IHO Definition: An area in which vessels of deep draught anchor or may anchor.

3) **Tanker anchorage**

   IHO Definition: An area in which tankers anchor or may anchor.

4) **Explosives anchorage**

   IHO Definition: An area set apart for anchored ships discharging or receiving explosives. (IHO Dictionary – S-32, Edition 5; 1732).

5) **Quarantine anchorage**

   IHO Definition: An area where a vessel anchors when satisfying quarantine regulations. (IHO Dictionary – S-32, Edition 5; 4117).

6) **Sea-plane anchorage**

   IHO Definition: An area in which sea-planes anchor or may anchor.

7) **Small craft anchorage**

   IHO Definition: An area in which yachts and small boats anchor or may anchor.

8) **Small craft mooring area**

   IHO Definition: An area in which yachts and small boats moor.

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.

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.

INT 1 Reference: N 12.1-9

16.1.1 Anchorages (see S-4 – B-431.1 and B-431.3)

If it is required to encode an anchorage area, it must be done using the feature **ACHARE**.

Geo feature: Anchorage area (**ACHARE**)
Attributes: CATACH DATEND DATSTA NOBJNM
OBJNAM - name or number of the anchorage
PEREND PERSTA RESTRN STATUS
INFORM - additional information about the category of anchorage
NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND
SORDAT SORIND

Remarks:

- Individual recommended anchorages without defined limits should be encoded as **ACHARE** features of type point, with attributes CATACH = *1* (unrestricted anchorage) and STATUS = *3* (recommended).
- Areas with numerous small craft moorings (see M4 – B-431.7) may be encoded as **ACHARE** features of type area, with CATACH = *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 CATACH = *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 CATACH = *10* (anchorage for limited period of time). The specific limit of time should be encoded using the attribute INFORM (e.g. *Anchorage limited to 12 hours*).

Distinction: Anchor berth; mooring/warping facility.

16.2 Anchor berth

IHO Definition: **ANCHOR BERTH**. A designated area of water where a single vessel, sea plane, etc... may anchor. (S-57, Appendix A – Chapter 1, Edition 3.1, Page 1.6, November 2000).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**ACHBRT** (P, A)	CATACH (O) Category of anchorage	1 : unrestricted anchorage 2 : deep water anchorage 3 : tanker anchorage 4 : explosives anchorage 5 : quarantine anchorage 6 : sea-plane 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	L
		RADIUS (O) Radius	Unit: Defined in the HUNI subfield of the DSPM record or the HUNITS attribute of the M_UNIT meta feature: metre Resolution: 0·1m Format: xxx.x Example: **26** for a radius of 26 metres	F
		STATUS (O) 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~~	L

Comment [j215]: S-57 Extension 06/01.

Category of anchorage: IHO Definition:

1) **Unrestricted anchorage**

   IHO Definition: An area in which vessels anchor or may anchor. (IHO Dictionary – S-32, Edition 5; 130).

2) **Deep water anchorage**

   IHO Definition: An area in which vessels of deep draught anchor or may anchor.

3) **Tanker anchorage**

IHO Definition: An area in which tankers anchor or may anchor.

4) **Explosives anchorage**

IHO Definition: An area set apart for anchored ships discharging or receiving explosives. (IHO Dictionary – S-32, Edition 5; 1732).

5) **Quarantine anchorage**

IHO Definition: An area where a vessel anchors when satisfying quarantine regulations. (IHO Dictionary – S-32, Edition 5; 4117).

6) **Sea-plane anchorage**

IHO Definition: An area in which sea-planes anchor or may anchor.

7) **Small craft anchorage**

IHO Definition: An area in which yachts and small boats anchor or may anchor.

8) **Small craft mooring area**

IHO Definition: An area in which yachts and small boats moor.

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.

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.

Radius: IHO Definition: The vector extending from the centre to the periphery of a circular or spherical object.

INT 1 Reference: N 11.1-2

16.2.1 Anchor berths (see S-4 – B-431.2)

If it is required to encode an anchor berth, it must be done using the feature **ACHBRT**.

Geo feature: Anchor berth (**ACHBRT**)
Attributes: CATACH DATEND DATSTA NOBJNM
OBJNAM - name or number of the berth
PEREND PERSTA
RADIUS - radius of the swinging circle in metres
STATUS
INFORM - additional information about the category of anchorage
NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND
SORDAT SORIND

Remarks:

- 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.

16.3 Sea-plane landing area

IHO Definition: **SEA-PLANE LANDING AREA**. A designated portion of water for the landing and take-off of sea-planes. (S-57, Appendix A – Chapter 1, Edition 3.1, Page 1.152, November 2000).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**SPLARE** (P, A)	RESTRN (O) Restriction	~~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 artifacts prohibited~~ ~~23 : cargo transhipment (lightering) prohibited~~ ~~24 : dragging prohibited~~ ~~25 : stopping prohibited~~ ~~26 : landing prohibited~~ ~~27 : speed restricted~~ 28 : swimming prohibited	L
		STATUS (O) 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~~	L

Comment [j216]: S-57 Extension 06/01.

			~~17 : un-watched~~ ~~18 : existence doubtful~~ ~~19 : buoyed~~	

Comment [j217]: S-57 Extension 06/01.

INT 1 Reference: N 13

16.3.1 Seaplane landing areas (see S-4 – B-449.6)

If it is required to encode a seaplane landing area, it must be done using the feature **SPLARE**.

Geo feature: Seaplane landing area (**SPLARE**)

Attributes:

NOBJNM	OBJNAM	PEREND	PERSTA	RESTRN	STATUS
INFORM	NINFOM	NTXTDS	SCAMIN	TXTDSC	RECDAT
RECIND	SORDAT	SORIND			

Remarks:

- If it is required to encode an anchorage for seaplanes, it must be done using an **ACHARE** feature (see clause X.X), with attribute CATACH = *6* (seaplane anchorage).

Distinction: Airport area.

16.4 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. (Derived from IHO Chart Specifications, S-4).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol*	**DMPGRD** (P, A)	CATDPG (O) Category of dumping ground	2 : chemical waste dumping ground 3 : nuclear waste dumping ground 4 : explosives dumping ground 5 : spoil ground 6 : vessel dumping ground	L
ECDIS Symbol		RESTRN (O) Restriction	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 artifacts prohibited~~ ~~23 : cargo transhipment (lightering) prohibited~~ ~~24 : dragging prohibited~~ ~~25 : stopping prohibited~~ ~~26 : landing prohibited~~ ~~27 : speed restricted~~ ~~28 : swimming prohibited~~	L
		STATUS (O) Status	~~1 : permanent~~ ~~2 : occasional~~ ~~3 : recommended~~ 4 : not in use 5 : periodic/intermittent ~~6 : reserved~~	L

Comment [j218]: S-57 Extension 06/01.

			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	

Comment [j219]: S-57 Extension 06/01.

Category of dumping ground: IHO Definition:

2) **Chemical waste dumping ground**

IHO Definition: An area at sea where chemical waste is dumped.

3) **Nuclear waste dumping ground**

IHO Definition: An area at sea where nuclear waste is dumped.

4) **Explosives dumping ground**

IHO Definition: An area at sea where explosives are dumped.

5) **Spoil ground**

IHO Definition: An area at sea where dredged material is deposited. Also called dumping ground. (IHO Dictionary – S-32, Edition 5; 4930).

6) **Vessel dumping ground**

IHO Definition: An area at sea where disused vessels are scuttled.

INT 1 Reference: N 23-24, 62.1-2

16.4.1 Dumping grounds (see S-4 – B-442)

If it is required to encode a dumping ground, it must be done using the feature **DMPGRD**.

Geo feature:	Dumping ground (**DMPGRD**)					
Attributes:	CATDPG	NOBJNM	OBJNAM	RESTRN	STATUS	INFORM
	NINFOM	NTXTDS	SCAMIN	TXTDSC	RECDAT	RECIND
	SORDAT	SORIND				

Remarks:

- A **DMPGRD** feature of type area must be covered by features from Group 1 as appropriate (**DEPARE** or **UNSARE**).

Distinction: Dredged area; incineration area.

16.5 Military practice area

IHO Definition: **MILITARY PRACTICE AREA**. An area within which naval, military or aerial exercises are carried out. Also called an exercise area. (Adapted from IHO Dictionary – S-32, Edition 5; 1722).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**MIPARE** (P, A)	CATMPA (O) Category of military practice area	2 : torpedo exercise area 3 : submarine exercise area 4 : firing danger area 5 : mine-laying practice area 6 : small arms firing range	L
		RESTRN (O) Restriction	~~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 artifacts prohibited~~ ~~23 : cargo transhipment (lightering) prohibited~~ ~~24 : dragging prohibited~~ ~~25 : stopping prohibited~~ 26 : landing prohibited ~~27 : speed restricted~~ 28 : swimming prohibited	L
		STATUS (O) Status	~~1 : permanent~~ ~~2 : occasional~~ ~~3 : recommended~~ 4 : not in use 5 : periodic/intermittent ~~6 : reserved~~ 7 : temporary ~~8 : private~~ ~~9 : mandatory~~	L

Comment [j220]: S-57 Extension 06/01.

			~~11 : extinguished~~ ~~12 : illuminated~~ ~~13 : historic~~ ~~14 : public~~ ~~15 : synchronized~~ ~~16 : watched~~ ~~17 : un-watched~~ ~~18 : existence doubtful~~ ~~19 : buoyed~~	

Comment [j221]: S-57 Extension 06/01.

Category of dumping ground: IHO Definition:

2) **Torpedo exercise area**

IHO Definition: An area within which exercises are carried out with torpedoes.

3) **Submarine exercise area**

IHO Definition: An area within which submarine exercises are carried out.

4) **Firing danger area**

IHO Definition: Areas for bombing and missile exercises. (Adapted from IHO Dictionary – S-32, Edition 5; 441).

5) **Mine-laying practice area**

IHO Definition: An area within which mine laying exercises are carried out.

6) **Small arms firing range**

IHO Definition: An area for shooting pistols, rifles and machine guns etc. at a target.

INT 1 Reference: N 30-33

16.5.1 Military practice areas (see S-4 – B-441)

If it is required to encode a military practice area, it must be done using the feature **MIPARE**.

Geo feature: Military practice area (**MIPARE**)

Attributes:

CATMPA	DATEND	DATSTA	NOBJNM	OBJNAM	PEREND
PERSTA	RESTRN	STATUS	INFORM	NINFOM	NTXTDS
SCAMIN	TXTDSC	RECDAT	RECIND	SORDAT	SORIND

Remarks:

Distinction: Caution area; restricted area; submarine transit lane.

16.6 Administration area

IHO Definition: **ADMINISTRATION AREA**. A defined (and possibly named) administrative area. (S-57, Appendix A – Chapter 1, Edition 3.1, Page 1.3, November 2000).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World	**ADMARE** (A)	JRSDTN (M) Jurisdiction	1 : international 2 : national 3 : national sub-division	E
Paper Chart Symbol		NATION (O) Nationality	The nationality is encoded by a 2 character code following ISO 3166 (refer to S-57 Appendix A).	A
ECDIS Symbol		OBJNAM (O) Object name		S

Jurisdiction: IHO Definition: The jurisdiction applicable to an administrative area.

1) **International**

   IHO Definition: Involving more than one country; covering more than one national area.

2) **National**

   IHO Definition: An area administered or controlled by a single nation.

3) **National sub-division**

   IHO Definition: An area smaller than the nation in which it lies.

Nationality: IHO Definition:

Remarks:

- The attribute "nationality" indicates the nationality of the specific feature.

Object name: IHO Definition: The individual name of an object.

INT 1 Reference: N 40-45, 47-49

16.6.1 International and national territories (named)

If it is required to encode named international or national territory, it must be done using the feature **ADMARE**.

Geo feature: Administration area (**ADMARE**)

Attributes: JRSDTN NATION NOBJNM OBJNAM INFORM NINFOM NTXTDS PICREP SCAMIN TXTDSC RECDAT RECIND SORDAT SORIND

Remarks:

Distinction: Land region; contiguous zone; continental shelf area; exclusive economic zone; fishery zone; territorial sea area.

16.7 Cargo transhipment area

IHO Definition: **CARGO TRANSHIPMENT AREA**. An area designated for the transfer of cargo from one vessel to another. (Adapted from IHO Dictionary – S-32, Edition 5; 5593).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**CTSARE** (P, A)	STATUS (O) 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~~	L

Comment [j222]: S-57 Extension 06/01.

INT 1 Reference: N 64

16.7.1 Cargo transhipment areas

If it is required to encode a cargo transhipment area, it must be done using the feature **CTSARE**.

Geo feature: Cargo transshipment areas (**CTSARE**)

Attributes:

DATEND	DATSTA	NOBJNM	OBJNAM	PEREND	PERSTA
STATUS	INFORM	NINFOM	NTXTDS	SCAMIN	TXTDSC
RECDAT	RECIND	SORDAT	SORIND		

Remarks:

Distinction: Dock area; harbour area (administrative); harbour facility.

16.8 Caution area

IHO Definition: **CAUTION AREA**. Generally, an area where the mariner has to be made aware of circumstances influencing the safety of navigation. (S-57, Appendix A – Chapter 1, Edition 3.1, Page 1.33, November 2000).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World	**CTNARE** (P, A)	INFORM (m) Information		S
Paper Chart Symbol *ECDIS Symbol*		TXTDSC (m) Textual description		S

Information: IHO Definition: Textual information about the feature.

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 INFORM. If formatted text is required, then the attribute TXTDSC must be used.

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 TXTDSC.

Comment [j223]: MD8 – 1.Cl.22 and 1.Co.15.

INT 1 Reference: NOT SPECIFIED

16.8.1 Caution areas

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), it must be done using the feature **CTNARE**. This feature may be required to identify a danger, a risk, a rule or advice that is not directly related to a particular object.

Geo feature: Caution area (**CTNARE**)
Attributes: DATEND DATSTA PEREND PERSTA INFORM NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND SORDAT SORIND

Remarks:
- Some nations have introduced collision regulations (COLREGS) 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 may be done using the object class **CTNARE**, with the attributes INFORM and/or TXTDSC containing a short explanation about the regulation. The attribute TXTDSC may be used instead of INFORM, or for longer explanations or notes.

Distinction: Wrecks; underwater rocks; obstructions; unsurveyed area.

16.9 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, Edition 5; 993).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World	**CONZNE** (A)	NATION (M) Nationality	The nationality is encoded by a 2 character code following ISO 3166 (refer to S-57 Appendix A).	A
Paper Chart Symbol *ECDIS Symbol*		STATUS (O) 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~~	L

Comment [j224]: S-57 Extension 06/01.

Nationality: IHO Definition:

Remarks:

- The attribute "nationality" indicates the nationality of the specific feature.

INT 1 Reference: N 44

16.9.1 Contiguous zones

If it is required to encode a contiguous zone, it must be done using the feature **CONZNE**.

Geo feature: Contiguous zone (**CONZNE**)

Attributes: DATEND DATSTA NATION STATUS INFORM NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND SORDAT SORIND

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 **CTNARE** object should be encoded covering the entire disputed area, with caution notes advising that the area is in dispute encoded using the attributes INFORM and/or TXTDSC.

Distinction: Administrative area; continental shelf area; exclusive economic zone; fishery zone; territorial sea area.

16.10 Continental shelf area

IHO Definition: **CONTINENTAL SHELF AREA**. The continental shelf of a coastal State comprises the sea bed 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 S-51).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**COSARE** (A)	NATION (M) Nationality	The nationality is encoded by a 2 character code following ISO 3166 (refer to S-57 Appendix A).	A

Nationality: IHO Definition:

Remarks:
- The attribute "nationality" indicates the nationality of the specific feature.

INT 1 Reference:

16.10.1 Continental shelf

If it is required to encode a continental shelf, it must be done using the feature **COSARE**.

Geo feature: Continental shelf area (**COSARE**)
Attributes: NATION NOBJNM OBJNAM INFORM NINFOM NTXTDS
SCAMIN TXTDSC RECDAT RECIND SORDAT SORIND

Remarks:

Distinction: Administrative area; contiguous zone; exclusive economic zone; fishery zone; territorial sea area.

16.11 Custom zone

IHO Definition: **CUSTOM AREA**. The area within which national custom regulations are in force. (S-57, Appendix A – Chapter 1, Edition 3.1, Page 1.46, November 2000).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**CUSZNE** (A)	NATION (M) Nationality	The nationality is encoded by a 2 character code following ISO 3166 (refer to S-57 Appendix A).	A

Nationality: IHO Definition:

Remarks:
- The attribute "nationality" indicates the nationality of the specific feature.

INT 1 Reference: N 48

16.11.1 Custom Zones

If it is required to encode a custom zone, it must be done using the feature **CUSZNE**.

Geo feature: Custom zone (**CUSZNE**)
Attributes: NATION INFORM NINFOM NTXTDS SCAMIN TXTDSC
RECDAT RECIND SORDAT SORIND

Remarks:

Distinction: Check point; free port area.

16.12 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, Edition 5; 1723).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**EXEZNE** (A)	NATION (M) Nationality	The nationality is encoded by a 2 character code following ISO 3166 (refer to S-57 Appendix A).	A

Nationality: IHO Definition:

Remarks:
- The attribute "nationality" indicates the nationality of the specific feature.

INT 1 Reference: N 47

16.12.1 Exclusive Economic Zones

If it is required to encode an Exclusive Economic Zone (EEZ), it must be done using the feature **EXEZNE**.

Geo feature: Exclusive Economic Zones (**EXEZNE**)
Attributes: NATION INFORM NINFOM NTXTDS SCAMIN TXTDSC
RECDAT RECIND SORDAT SORIND

Remarks:
- Where issues of maritime jurisdiction between two or more coastal States are in dispute, the proposed Territorial Sea of one coastal State may overlap the proposed Exclusive Economic Zone of another coastal State. Where an area is in dispute, a **CTNARE** feature should be encoded covering the entire disputed area, with caution notes advising that the area is in dispute encoded using the attributes INFORM and/or TXTDSC.

Distinction: Administrative area; contiguous zone; continental shelf area; fishery zone; territorial sea area.

16.13 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, Edition 5; 1816).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World	**FSHZNE** (A)	NATION (M) Nationality	The nationality is encoded by a 2 character code following ISO 3166 (refer to S-57 Appendix A).	A
Paper Chart Symbol *ECDIS Symbol*		STATUS (O) 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~~	L

Comment [j225]: S-57 Extension 06/01.

Nationality: IHO Definition:

Remarks:
- The attribute "nationality" indicates the nationality of the specific feature.

INT 1 Reference: N 45

16.13.1 Fishery zones

If it is required to encode a fishery zone, it must be done using the feature **FSHZNE**.

Geo feature: Exclusive economic zones (**FSHZNE**)
Attributes: NATION NOBJNM OBJNAM STATUS
INFORM - value and unit of measure of the associated limit (e.g. *6 M* or *12 M*)
NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND
SORDAT SORIND

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.

16.14 Fishing ground

IHO Definition: **FISHING GROUND**. A water area in which fishing is frequently carried on. (IHO Dictionary – S-32, Edition 5; 1814).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World	**FSHGRD** (A)	PEREND (O) Periodic date end	See below for description and example of formatted string value	A
Paper Chart Symbol		PERSTA (O) Periodic date start	See below for description and example of formatted string value	A
ECDIS Symbol		RESTRN (O) Restriction	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 artifacts prohibited~~ ~~23 : cargo transhipment (lightering) prohibited~~ ~~24 : dragging prohibited~~ ~~25 : stopping prohibited~~ ~~26 : landing prohibited~~ ~~27 : speed restricted~~ ~~28 : swimming prohibited~~	L
		STATUS (O) Status	~~1 : permanent~~ ~~2 : occasional~~ ~~3 : recommended~~ ~~4 : not in use~~ 5 : periodic/intermittent	L

Comment [j226]: S-57 Extension 06/01.

Comment [j227]: S-57 Extension 06/01.

			~~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~~	

Comment [j228]: S-57 Extension 06/01.

Periodic date end: IHO Definition: The end of the active period for a seasonal feature (e.g. a buoy). See also "date end".

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.

Periodic date start: IHO Definition: The start of the active period for a seasonal feature (e.g. a buoy). See also "date start".

Indication: The "periodic date srart" 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.

Status: IHO Definition:

5) **Periodic/intermittent**

IHO Definition: Recurring at intervals. (The Concise Oxford Dictionary, 7th Edition).

INT 1 Reference:

16.14.1 Fishing grounds

If it is required to encode a fishing ground, it must be done using the feature **FSHGRD**.

Geo feature: Fishing ground (**FSHGRD**)

Attributes:

NOBJNM	OBJNAM	PEREND	PERSTA	RESTRN	STATUS
INFORM	NINFOM	NTXTDS	SCAMIN	TXTDSC	RECDAT
RECIND	SORDAT	SORIND			

Comment [j229]: S-57 Extension 06/01.

Remarks:

Distinction: Fishery zone.

16.15 Free port area

IHO Definition: **FREE PORT AREA**. A port where certain import and export duties are waived (unless goods pass into the country) to facilitate reshipment to other countries. (IHO Dictionary – S-32, Edition 5; 1927).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**FRPARE** (A)	STATUS (O) 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~~	L

Comment [j230]: S-57 Extension 06/01.

INT 1 Reference:

16.15.1 Free port areas

If it is required to encode a free port area, it must be done using the feature **FRPARE**.

Geo feature: Free port area (**FRPARE**)

Attributes: NOBJNM OBJNAM STATUS INFORM NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND SORDAT SORIND

Remarks:

Distinction: Custom zone; production/storage area.

16.16 Harbour area (administrative)

IHO Definition: **HARBOUR AREA**. The area over which a harbour authority has jurisdiction. (S-57, Appendix A – Chapter 1, Edition 3.1, Page 1.80, November 2000).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World	**HRBARE** (A)	OBJNAM (M) Object name		S
Paper Chart Symbol *ECDIS Symbol*		STATUS (O) 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~~	L

Comment [j231]: S-57 Extension 06/01.

Object name: IHO Definition: The individual name of an object.

INT 1 Reference: N 49

16.16.1 Administrative harbour areas (see S-4 – B-430.1)

If it is required to encode an administrative harbour area, it must be done using the feature **HRBARE**.

Geo feature: Harbour area (**HRBARE**)

Attributes: NOBJNM OBJNAM STATUS INFORM NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND SORDAT SORIND

Remarks:

- A masked line may be used to suppress the symbolisation of the boundary, where such symbolisation is considered inappropriate.

Distinction: Dock area.

16.17 Incineration area

IHO Definition: **INCINERATION AREA**. An offshore area officially designated as suitable for the burning of chemical waste by specially equipped ships. (IHO Dictionary – S-32, Edition 5; 2408).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**ICNARE** (P, A)	RESTRN (O) Restriction	~~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 artifacts prohibited~~ ~~23 : cargo transhipment (lightering) prohibited~~ ~~24 : dragging prohibited~~ ~~25 : stopping prohibited~~ ~~26 : landing prohibited~~ ~~27 : speed restricted~~ ~~28 : swimming prohibited~~	L
		STATUS (O) 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~~	L

Comment [j232]: S-57 Extension 06/01.

			~~17 : un-watched~~ ~~18 : existence doubtful~~ ~~19 : buoyed~~	

Comment [j233]: S-57 Extension 06/01.

INT 1 Reference: N 65

16.17.1 Incineration areas (see S-4 – B-449.3)

If it is required to encode an incineration area, it must be done using the feature **ICNARE**.

Geo feature: Incineration area (**ICNARE**)

Attributes: NOBJNM OBJNAM PEREND PERSTA RESTRN STATUS INFORM NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND SORDAT SORIND

Remarks:

Distinction: Custom ground.

16.18 Log pond

IHO Definition: **LOG POND**. A maritime area enclosed with connected floating timbers used as a staging area for sawn logs. (S-57, Appendix A – Chapter 1, Edition 3.1, Page 1.102, November 2000).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**LOGPON** (P, A)	STATUS (O) 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~~	L

Comment [j234]: S-57 Extension 06/01.

INT 1 Reference: N 61

16.18.1 Log ponds (see S-4 – B-449.2)

If it is required to encode a log pond, it must be done using the feature **LOGPON**.

Geo feature: Log pond (**LOGPON**)

Attributes:						
	NOBJNM	OBJNAM	STATUS	INFORM	NINFOM	NTXTDS
	SCAMIN	TXTDSC	RECDAT	RECIND	SORDAT	SORIND

Remarks:

- Log ponds are also known as booming grounds.

Distinction: Custom ground.

16.19 Oil barrier

IHO Definition: **OIL BARRIER**. A construction to dam oil flow on water. (S-57, Appendix A – Chapter 1, Edition 3.1, Page 1.114, November 2000).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**OILBAR** (L)	CATOLB (O) Category of oil barrier	1 : oil retention (high pressure pipe) 2 : floating oil barrier	E
		CONDTN (O) Condition	1 : under construction 2 : ruined ~~3 : under reclamation~~ ~~4 : wingless~~ 5 : planned construction	E
		STATUS (O) 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~~	L

Comment [j235]: S-57 Extension 06/01.

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).

INT 1 Reference: F 29.1-2

16.19.1 Oil barriers

If it is required to encode an oil barrier, it must be done using the feature **OILBAR**.

Geo feature: Oil barrier (**OILBAR**)

Attributes:

CATOLB	CONDTN	DATEND	DATSTA	NOBJNM	OBJNAM
STATUS	INFORM	NINFOM	NTXTDS	SCAMIN	TXTDSC
RECDAT	RECIND	SORDAT	SORIND		

Remarks:
Distinction:

16.20 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, Edition 5; 390).

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, Edition 5; 393).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**STSLNE** (L)	NATION (M) Nationality	The nationality is encoded by a 2 character code following ISO 3166 (refer to S-57 Appendix A).	A

Nationality: IHO Definition:

Remarks:
- The attribute "nationality" indicates the nationality of the specific feature.

INT 1 Reference: N 42

16.20.1 Territorial seas

A territorial sea is delimited by:
- Territorial sea baselines (drying lines),
- Straight territorial sea baselines,
- International maritime boundaries,
- Seaward limits of territorial seas.

If it is required to encode a straight territorial sea baseline, it must be done using the feature **STSLNE**.

Geo feature: Straight territorial sea baseline (**STSLNE**)
Attribute: NATION INFORM NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND SORDAT SORIND

Remarks:

Distinction:

16.21 Territorial sea area

IHO Definition: **TERRITORIAL SEA AREA**. The territorial sea is 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, Edition 5; 5360).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World	**TESARE** (A)	NATION (M) Nationality	The nationality is encoded by a 2 character code following ISO 3166 (refer to S-57 Appendix A).	A
Paper Chart Symbol *ECDIS Symbol*		RESTRN (O) Restriction	~~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 artifacts prohibited ~~23 : cargo transhipment (lightering) prohibited~~ ~~24 : dragging prohibited~~ ~~25 : stopping prohibited~~ ~~26 : landing prohibited~~ ~~27 : speed restricted~~ ~~28 : swimming prohibited~~	L

Comment [j236]: S-57 Extension 06/01.

INT 1 Reference: N 43

16.21.1 Territorial seas

A territorial sea is delimited by:

- Territorial sea baselines (drying lines),
- Straight territorial sea baselines,
- International maritime boundaries,
- Seaward limits of territorial seas.

If it is required to encode a territorial sea area, it must be done using the feature **TESARE**.

Geo feature: Territorial sea area (**TESARE**)

Attribute:	NATION	RESTRN	INFORM	NINFOM	NTXTDS	SCAMIN
	TXTDSC	RECDAT	RECIND	SORDAT	SORIND	

Remarks:

- Where issues of maritime jurisdiction between two or more coastal States are in dispute, the proposed Territorial Sea of one coastal State may overlap the proposed Exclusive Economic Zone of another coastal State. Where an area is in dispute, a **CTNARE** feature should be encoded covering the entire disputed area, with caution notes advising that the area is in dispute encoded using the attributes INFORM and/or TXTDSC.

Distinction:

16.22 Submarine transit lane

IHO Definition: **SUBMARINE TRANSIT LANE**. An area where submarines may navigate under water or at the surface. (S-57, Appendix A – Chapter 1, Edition 3.1, Page 1.168, November 2000).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**SUBTLN** (A)	RESTRN (O) Restriction	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 artifacts prohibited~~ ~~23 : cargo transhipment (lightering) prohibited~~ ~~24 : dragging prohibited~~ ~~25 : stopping prohibited~~ ~~26 : landing prohibited~~ ~~27 : speed restricted~~ ~~28 : swimming prohibited~~	L

Comment [j237]: S-57 Extension 06/01.

INT 1 Reference: N 33

16.22.1 Submarine transit lanes (see S-4 – B-441.5)

If it is required to encode a submarine transit lane, it must be done using the feature **SUBTLN**.

Geo feature: Submarine transit lane (**SUBTLN**)

Attributes: NOBJNM OBJNAM INFORM NINFOM RESTRN NTXTDS SCAMIN TXTDSC RECDAT RECIND SORDAT SORIND

Remarks:

Distinction:

16.23 Restricted area

IHO Definition: **RESTRICTED AREA**. A specified area on land or water designated by an appro authority within which access or navigation is restricted in accordance with certain specified cond (Adapted from IHO Dictionary – S-32, Edition 5; 4366).

Comment [j238]: MD8 – 2.Co.2 and 2.Cl.2.

Comment [j239]: MD8 – 2.Co.2 and 2.Cl.2.

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**RESARE** (A)	CATREA (m) Category of restricted area	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	L
		RESTRN (m) Restriction	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	L

Comment [j240]: S-57 Supplement No. 1.

Comment [j241]: S-57 Extension 06/01.

			22 : removal of historical artifacts prohibited 23 : cargo transhipment (lightering) prohibited 24 : dragging prohibited 25 : stopping prohibited 26 : landing prohibited 27 : speed restricted 28 : swimming prohibited	
		STATUS (O) 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	L

Comment [j242]: S-57 Extension 06/01.

Comment [j243]: S-57 Extension 06/01.

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; 4471).

4) **Nature reserve**

IHO Definition: A tract of land or water managed so as to preserve its flora, fauna, physical features;

Comment [j244]: MD8 – 2.Co.3 and 2.Cl.5

5) **Bird sanctuary**

IHO Definition: A place where birds are bred and protected.

6) **Game reserve**

IHO Definition: A place where wild animals or birds hunted for sport or food are kept undisturbed for private use.

7) **Seal sanctuary**

IHO Definition: A place where seals are protected.

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 sea bed in the range and there are cables leading from the range to a control position ashore. (IHO Chart Specifications, S-4).

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). (IHO Chart Specifications, S-4).

12) **Navigational aid safety zone**

IHO Definition: An area around a navigational aid which vessels are prohibited from entering.

14) **Minefield**

IHO Definition: An area laid and maintained with explosive mines for defence or practice purposes.

18) **Swimming area**

IHO Definition: An area in which people may swim and therefore vessel movement may be restricted.

19) **Waiting area**

IHO Definition: An area reserved for vessels waiting to enter a harbour.

20) **Research area**

IHO Definition: An area where marine research takes place.

21) **Dredging area**

IHO Definition: An area where dredging is taking place.

22) **Fish sanctuary**

IHO Definition: A place where fish (including shellfish and crustaceans) are protected.

Comment [j245]: 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 creatures to each other and to their surroundings.

Comment [j246]: 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.

25) **Swinging area**

IHO Definition: An area where vessels turn. (Service Hydrographique et Océanographique de la Marine, France).

26) **Water skiing area**

IHO Definition: An area within which people may water ski and therefore vessel movement may be restricted.

27) **Environmentally sensitive sea area**

IHO Definition: A generic term which may be used to describe a wide range of areas, considered sensitive for a variety of environmental reasons. (IHO Chart Specifications, S-4).

28) **Particularly sensitive sea area**

IHO Definition: An area that needs special protection through action by IMO because of its significance for regional ecological, socio-economic or scientific reasons and because it may be vulnerable to damage by international shipping activities. (IHO Chart Specifications, S-4).

29) **Disengagement area**

IHO Definition: An area near a fairway where vessels can go to clear the way or make an about turn and possibly return to a waiting area when 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".

Restriction: IHO Definition:

1) **Anchoring prohibited**

   IHO Definition: An area within which anchoring is not permitted.

2) **Anchoring restricted**

   IHO Definition: A specified area designated by appropriate authority, within which anchoring is restricted in accordance with certain specified conditions.

3) **Fishing prohibited**

   IHO Definition: An area within which fishing is not permitted.

4) **Fishing restricted**

   IHO Definition: A specified area designated by appropriate authority, within which fishing is restricted in accordance with certain specified conditions.

5) **Trawling prohibited**

   IHO Definition: An area within which trawling is not permitted.

6) **Trawling restricted**

   IHO Definition: A specified area designated by appropriate authority, within which trawling is restricted in accordance with certain specified conditions.

7) **Entry prohibited**

   IHO Definition: An area within which navigation and/or anchoring is prohibited. (Adapted from IHO Dictionary – S-32, Edition 5; 4044).

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, Edition 5; 4366).

9) **Dredging prohibited**

   IHO Definition: An area within which dredging is not permitted.

10) **Dredging restricted**

    IHO Definition: A specified area designated by appropriate authority, within which dredging is restricted in accordance with certain specified conditions.

11) **Diving prohibited**

    IHO Definition: An area within which diving is not permitted.

12) **Diving restricted**

    IHO Definition: A specified area designated by appropriate authority, within which diving is restricted in accordance with certain specified conditions.

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.

14) **Area to be avoided**

    IHO Definition: An IMO designated area to be avoided, defined as a routeing measure. (Adapted from IHO Chart Specifications, S-4, 435.7).

15) **Construction prohibited**

IHO Definition: The erection of permanent or temporary fixed structures or artificial islands is prohibited.

16) **Discharging prohibited**

IHO Definition: An area within which discharging or dumping is prohibited..

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.

18) **Industrial or mineral exploration/development prohibited**

IHO Definition: An area within which industrial or mineral exploration and development are prohibited.

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.

20) **Drilling prohibited**

IHO Definition: An area within which excavating a hole on the sea-bottom with a drill is prohibited.

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.

22) **Removal of historical artifacts prohibited**

IHO Definition: An area within which the removal of historical artifacts is prohibited.

23) **Cargo transhipment (lightering) prohibited**

IHO Definition: An area in which cargo transhipment (lightering) is prohibited.

24) **Dragging prohibited**

IHO Definition: An area in which the dragging of anything along the bottom, e.g. bottom trawling, is prohibited.

25) **Stopping prohibited**

IHO Definition: An area in which a vessel is prohibited from stopping.

26) **Landing prohibited**

IHO Definition: An area in which landing is prohibited.

27) **Speed restricted**

IHO Definition: An area within which speed is restricted.

28) **Swimming prohibited**

IHO Definition: An area in which swimming is prohibited.

Comment [j247]: 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 “entering prohibited”, the restriction for an “anchoring prohibition area” is “anchoring prohibited”.
- The complete information about the restriction(s), actually held in handbooks or other publications, may be encoded by the attribute “TXTDSC”. A short explanation may be given by the use of the attribute “INFORM”.

INT 1 Reference: L 3; N 2.1-2, 20-22, 25-26, 31, 34

16.23.1 Restricted areas in general (see S-4 – B-439.2 to B-439.4)

If it is required to encode a restricted area, it must be done using the feature **RESARE**, or using other features having the attribute RESTRN (**ACHARE**, **CBLARE**, **DMPGRD**, **DRGARE**, **DWRTPT**, **FAIRWY**, **ICNARE**, **ISTZNE**, **MARCUL**, **MIPARE**, **OSPARE**, **PIPARE**, **PRCARE**, **SPLARE**, **SUBTLN**, **TESARE**, **TSSCRS**, **TSSLPT**, **TSSRON**).

Geo feature: Restricted area (**RESARE**)

Attributes:

CATREA - describes the reason for the regulation

DATEND DATSTA NOBJNM OBJNAM PEREND PERSTA

RESTRN - describes the restrictions

STATUS

INFORM - a short explanation about the regulation (e.g. caution note from paper chart). The attribute TXTDSC may be used instead of INFORM, or for longer explanations or note.

NINFOM NTXTDS SCAMIN TXTDSC RECDAT RECIND

SORDAT SORIND

Remarks:

- 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 **CTNARE** (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.

Distinction: Anchorage area; cable area; caution area; dumping ground; depth area; fairway; dredged area; deep water route; military practice area; pipeline area; swept area.

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: **BCNCAR**, **BCNISD**, **BCNLAT**, **BCNSAW**, **BCNSPP**, **BOYCAR**, **BOYINB**, **BOYISD**, **BOYLAT**, **BOYSAW**, **BOYSPP**, **BRIDGE**, **BUISGL**, **DAYMAR**, **LITFLT**, **LITVIS**, **LNDMRK**, **MORFAC**, **OFSPLF**, **PILPNT**, **SLCONS**.

Equipment features consist of: **DAYMAR**, **FOGSIG**, **LIGHTS**, **RADSTA**, **RDOSTA**, **RETRFL**, **RTPBCN**, **SISTAT**, **SISTAW**, **TOPMAR**.

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 CONRAD = *3* (radar conspicuous (has radar reflector) on the structure feature.

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 feature as the navigational aid.

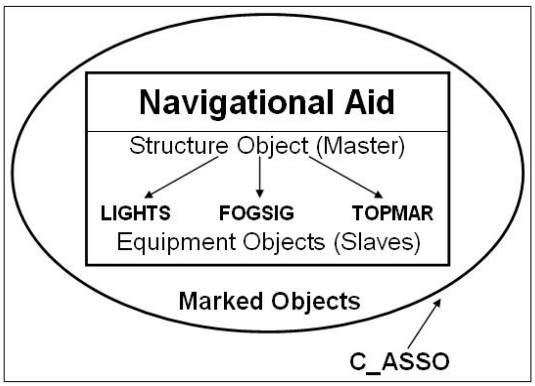
17.2 Relationships

A master to slave relationship must be created in order to relate the different features comprising a navigational aid.

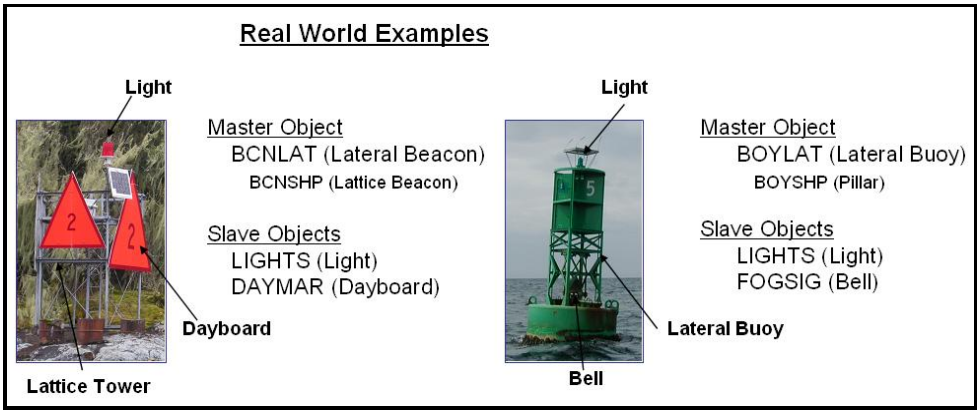
When the navigational aid contains a structure feature (from the list above), this feature must be the master feature, and the equipment features must be the slaves. Note that **DAYMAR** may be a master feature or a slave feature; where a navigational aid contains a **DAYMAR** and there is no other base structure indicated on the source, the **DAYMAR** feature should be encoded as the master feature.

Comment [j248]: ENC EB No. XX.

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 **LIGHTS** feature, if one exists. Alternatively, a **PILPNT** feature of type point 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, a **PILPNT** feature of type point must be encoded as the structure feature at the same position as the equipment features.



Navigational Aids – Master / Slave Relationship



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 features, and they must share the same geographic point spatial feature.

If it is required to encode the name of the navigational aid, it must be done using the attribute OBJNAM (and possibly the attribute NOBJNM) 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 OBJNAM if it is based on the Latin alphabet. If the name is not based on the Latin alphabet, it must be encoded on NOBJNM, and transliterated for encoding on OBJNAM.

All point features comprising a navigational aid must share the same geographic point spatial feature.

The navigational aid may be associated with the features which it marks (e.g. to **RESARE** or **OBSTRN** 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

The buoyage system of the data set and, where necessary, the direction of buoyage, must be encoded using the meta feature **M_NSYS** (see clause X.X).

17.4 Colours and colour patterns

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

- For horizontal stripes (COLPAT = *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 (COLPAT = *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 (COLPAT = *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 (COLPAT = *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 (COLPAT = *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 COLPAT.

17.5 Radar conspicuous features

The attribute CONRAD (conspicuous, radar) 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 CONRAD = *1* (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 CONRAD = *3* (radar conspicuous (has radar reflector)) on the feature.
- If it is required to encode radar reflectors on line features (e.g. overhead cables), this must be done using the feature **RADRFL** (see clause X.X).

17.6 Dates

When encoding dates using the attributes CPDATE, DATEND, DATSTA, PEREND, PERSTA, SORDAT, SUREND and SURSTA, 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.

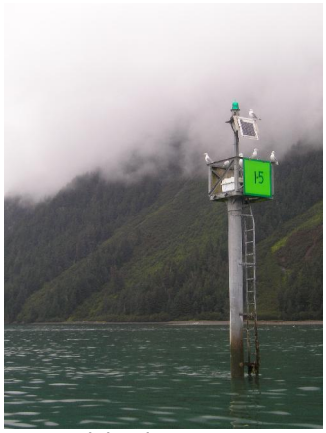
17.6.1 Seasonal objects

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 attributes PERSTA and PEREND.

18 Lights

18.1 Light

IHO Definition: **LIGHT**. A luminous or lighted aid to navigation. (IHO Dictionary – S-32, Edition 5; 2766).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World  Lighthouse *Photograph, courtesy of the Pacific Hydrographic Branch*  Green Lighted Beacon *Photograph, courtesy of the Pacific Hydrographic Branch*  Red Lighted Beacon *Photograph, courtesy of the Pacific Hydrographic Branch*	**LIGHTS** (P)	CATLIT (m) Category of light	1 : directional function 4 : leading light 5 : aero light 6 : air obstruction light 7 : fog detector light 8 : flood light 9 : strip light 10 : subsidiary light 11 : spotlight 12 : front 13 : rear 14 : lower 15 : upper 16 : moiré effect 17 : emergency 18 : bearing light 19 : horizontally disposed 20 : vertically disposed	L
		COLOUR (m) 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	L
		EXCLIT (O) Exhibition condition of light	1 : light shown without change of character 2 : daytime light 3 : fog light 4 : night light	E
		HEIGHT (O) Height	Unit: Defined in the HUNI subfield of the DSPM record or the HUNITS attribute of the M_UNIT meta feature: metre Resolution: 0·1m Format: xxx.x Example: **73** for a height of 73 metres	F

 Lighted Range Beacon *Photograph, courtesy of the Pacific Hydrographic Branch*  Lower Midnight Range Front Light *Photograph, courtesy of the Atlantic Hydrographic Branch*  Lower Midnight Range Rear Light *Photograph, courtesy of the Atlantic Hydrographic Branch*  Snow Cut Range Rear Light		LITCHR (m) Light characteristic	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/flash 14 : flash/long-flash 15 : occulting/flash 16 : fixed/long-flash 17 : occulting alternating 18 : long-flash alternating 19 : flash alternating 20 : group alternating 25 : quick-flash plus long-flash 26 : very quick-flash plus long-flash 27 : ultra quick-flash plus long-flash 28 : alternating 29 : fixed and alternating flashing	E
		LITVIS (O) Light visibility	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	L
		MLTYLT (O) Multiplicity of lights	Unit: None Resolution: 1 Format: xx Example: **5** for 5 co-located lights	I
		OBJNAM (O) Object name		S
		ORIENT (m) Orientation	Unit: Degree (°) – minimum value 0; maximum value 360 Resolution: 0·01° Format: xxx.xx Example: **246.7** for an	F

Comment [j249]: S-57 Extension 06/01.

Photograph, courtesy of the Atlantic Hydrographic Branch *Paper Chart Symbol* *ECDIS Symbol*			orientation of 246·7 degrees	
		SECTR1 (m) Sector limit one	Unit: Degree (°) Resolution: 0·01° Format: xxx.xx Example: **125** for a sector orientation of 125 degrees	F
		SECTR2 (m) Sector limit two	Unit: Degree (°) Resolution: 0·01° Format: xxx.xx Example: **220** for a sector orientation of 220 degrees	F
		SIGGRP (m) Signal group	See below for description and example of formatted string value	A
		SIGPER (m) Signal period	Unit: Seconds (s) – minimum value > 0 Resolution: 0·01s Format: xx.xx Example: **12** for an interval of 12 seconds	F
		SIGSEQ (O) Signal sequence	See below for description and example of formatted string value	A
		STATUS (O) 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~~	L
		VALNMR (O) Value of nominal range	Unit: Nautical mile (M) Resolution: 0·1M Format: xx.x Example: **14** for a nominal range of 14 nautical miles	F

Comment [j250]: MD8 – 7.Co.19.

Comment [j251]: S-57 Extension 06/01.

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, Edition 5; 2778).

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, Edition 5; 2794).

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. (IHO Chart Specifications, S-4, B-476.1).

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, Edition 5; 1885).

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. (IHO Chart Specifications, S-4, B-478.5).

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.

13) **Rear**

IHO Definition: Term used with leading lights to describe the position of the light on the lead as viewed from seaward.

14) **Lower**

IHO Definition: Term used with leading lights to describe the position of the light on the lead as viewed from seaward.

15) **Upper**

IHO Definition: Term used with leading lights to describe the position of the light on the lead as viewed from seaward.

16) **Moiré effect**

IHO Definition: A short range (up to 2km) type of directional light. Sodium lighting gives a yellow background to a screen on which a vertical black line will be seen by an observer on the centre line. (IHO

Chart Specifications, S-4, B-475.8).

17) **Emergency**

IHO Definition: A light available as a backup to a main light which will be illuminated should the main light fail.

18) **Bearing light**

IHO Definition: A light which enables its approximate bearing to be obtained without the use of a compass. (IHO Chart Specifications, S-4, B-478.1).

19) **Horizontally disposed**

IHO Definition: A group of lights of identical character and almost identical position, that are disposed horizontally.

20) **Vertically disposed**

IHO Definition: A group of lights of identical character and almost identical position, that are disposed vertically.

Remarks:

- Marine light (a light intended primarily for marine navigation) is not included in the above list. All lights are considered to be marine lights unless the attribute “category of light” indicates otherwise.

Colour pattern: IHO Definition:

1) **Horizontal stripes**

IHO Definition: Straight bands or stripes of differing colours painted horizontally.

2) **Vertical stripes**

IHO Definition: Straight bands or stripes of differing colours painted vertically.

3) **Diagonal stripes**

IHO Definition: Straight bands or stripes of differing colours painted diagonally (i.e. not horizontally or vertically).

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.

5) **Stripes (direction unknown)**

IHO Definition: Straight bands or stripes of differing colours painted in an unknown direction.

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.

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. (IHO Chart Specifications, S-4).

2) **Daytime light**

IHO Definition: A light which is only exhibited by day.

3) **Fog light**

IHO Definition: A light which is exhibited in fog or conditions of reduced visibility.

4) **Night light**

IHO Definition: A light which is only exhibited at night.

Height: IHO Definition: The value of the vertical distance to the highest point of the object, measured from a specified vertical datum.

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, Edition 5; 2780).

2) **Flashing**

IHO Definition: A rhythmic light in which the total duration of light in a period is clearly shorter than the total duration of darkness and all the appearances of light are of equal duration. (IHO Dictionary – S-32, Edition 5; 2783).

3) **Long-flashing**

IHO Definition: A flashing light in which a single flash of not less than two seconds duration is regularly repeated. (IHO Dictionary – S-32, Edition 5; 2796).

4) **Quick-flashing**

IHO Definition: A light exhibiting without interruption very rapid regular alternations of light and darkness. (IHO Dictionary – S-32, Edition 5; 2803).

5) **Very quick-flashing**

IHO Definition: A flashing light in which flashes are repeated at a rate of not less than 80 flashes per minute but less than 160 flashes per minute.

6) **Ultra quick-flashing**

IHO Definition: A flashing light in which flashes are repeated at a rate of not less than 160 flashes per minute.

7) **Isophased**

IHO Definition: A light with all durations of light and darkness equal. (IHO Dictionary – S-32, Edition 5; 2779).

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. (IHO Dictionary – S-32, Edition 5; 2801).

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; 2790).

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, Edition 5; 2792).

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, Edition 5; 2791).

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, Edition 5; 2798).

13) **Fixed/flash**

IHO Definition:

14) **Flash/long flash**

IHO Definition:

15) **Occulting/flash**

IHO Definition:

16) **Fixed/long flash**

IHO Definition:

17) **Occulting alternating**

IHO Definition:

18) **Long-flash alternating**

IHO Definition:

19) **Flash alternating**

IHO Definition:

20) **Group alternating**

IHO Definition:

25) **Quick-flash plus long-flash**

IHO Definition:

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, in any given direction, two or more colours in a regularly repeated sequence with a regular periodicity. (IHO Dictionary – S-32, Edition 5; 2770).

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.

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). (Adapted from IHO Chart Specifications, M-4).

2) **Low intensity**

IHO Definition: Non-marine lights with lower power than marine lights. (Bundesamt für Seeschiffahrt 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. (IHO Chart Specifications, M-4).

4) **Intensified**

IHO Definition: A light in a sector is intensified (i.e. has longer range than other sectors). (Bundesamt für Seeschiffahrt und Hydrographie, Germany).

5) **Unintensified**

IHO Definition: A light in a sector is unintensified (i.e. has shorter range than other sectors). (Bundesamt für Seeschiffahrt 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.

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, Edition 5; 3492).

8) **Partially obscured**

IHO Definition: This value specifies that parts of the sector are obscured..

9) **Visible in line of range**

IHO Definition: Lights that must be in line to be visible..

Comment [j252]: 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.

Multiplicity of lights: IHO Definition: The number of lights of identical character that exist as a co-located group.

Object name: IHO Definition: The individual name of an object.

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).

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 2 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).

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.

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 1 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).

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.

Signal group: IHO Definition: The number of signals, the combination of signals or the morse character(s) within one period of full sequence.

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		SIGGRP Indication
VQ(6)+LFl	->	(6)(1)
Fl+LFl(2+3)	->	(1)(2+3)
Fl(2)+Lfl(3)	->	(2)(3)
FFl	->	()(1)
Mo(AA)	->	(AA)
AlFl(2W+1R)	->	(2+1)
AlLFlWR	->	(2)
FOcW	->	()(1)
AlOc(4)WR	->	(4)

Signal period: IHO Definition: The time occupied by an entire cycle of intervals of light and eclipse.

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.

Indication: Unit for value of intervals: Seconds (s)

Resolution: 0·01s

Format (all non-fixed “light characteristics” except occulting):

LL.LL+(EE.EE)

Comment [j253]: MD8 – 5.Co.5.

Example:

00.80+(02.20)+00.80+(05.20)

Comment [j254]: MD8 – 5.Co.5.

The above example encodes a signal sequence for a flashing light with two intervals of light and two intervals of eclipse. Note: the above example has a signal group of (2) and a signal period of 9 seconds.

Format (occulting):

(EE.EE)+LL.LL

Comment [j255]: MD8 – 5.Co.5.

Example:

(00.80)+02.20+(00.80)+05.20

Comment [j256]: MD8 – 5.Co.5.

The above example encodes a signal sequence for an occulting light with two intervals of eclipse and tw intervals of light. Note: the above example has a signal group of (2) and a signal period of 9 seconds.

Comment [j257]: MD8 – 2.Cl.8

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).

Status: IHO Definition:

1) **Permanent**

IHO Definition: Intended to last or function indefinitely. (The Concise Oxford Dictionary, 7th Edition).

2) **Occasional**

IHO Definition: Acting on special occasions; happening irregularly. (The Concise Oxford Dictionary, 7th Edition).

4) **Not in use**

IHO Definition: Use has ceased, but the facility still exists intact; disused. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

5) **Periodic/intermittent**

IHO Definition: Recurring at intervals. (The Concise Oxford Dictionary, 7th Edition).

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).

11) **Extinguished**

IHO Definition: No longer lit.

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, Edition 5; 2814).

Value of nominal range: IHO Definition: The nominal range at which an object can be seen or a signal detected.

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, Edition 5; 4218).

INT 1 Reference: P 1-30.3, 40-65

18.1.1 Description of lights

If it is required to encode a light and its sectors, each sector of the light must be encoded using one separate **LIGHTS** feature. These features must be slave features of the same master feature, which is either the structure feature or one of the **LIGHTS**, so that the relationship between them is indicated using the master/slave relationship mechanism described in clause X.X.

Geo feature: Light (**LIGHTS**)
Attributes: CATLIT - mandatory for air obstruction and fog detector lights

COLOUR - mandatory except for air obstruction and fog detector lights
DATEND DATSTA EXCLIT
HEIGHT - prohibited for floating lights
LITCHR - mandatory except for air obstruction and fog detector lights
LITVIS MARSYS MLTYLT NOBJNM OBJNAM
ORIENT - prohibited, except for directional or moiré effect lights
PEREND PERSTA
SECTR1 - only for sector lights
SECTR2 - only for sector lights
SIGGRP - prohibited for fixed lights
SIGPER - prohibited for fixed lights
SIGSEQ - prohibited for fixed lights
STATUS VALNMR
VERDAT - applies only to HEIGHT; this value must only be encoded if it is different to the value encoded in the VDAT subfield of the Data Set Parameter (DSPM) field, or different to the value of VERDAT encoded on meta feature **M_VDAT**
INFORM NINFOM NTXTDS SCAMIN TXTDSC RECDAT
RECIND SORDAT SORIND

Remarks:

- If it is required to encode types and functions of lights, this must be done using the attribute CATLIT.
- If it is required to encode details of the lighting technology (e.g. neon), it must be done using the attribute INFORM.
- If it is required to encode the purpose of a marine spotlight, it must be done using INFORM.
- **LIGHTS** features located in the water must have a master structure object, generally a beacon (e.g. **BCNLAT, BCNSPP**) or other fixed structure (e.g. **OFSPLF**), or a buoy structure (e.g. **BOYLAT, BOYSPP**) 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 **PILPNT** feature should be encoded as the master feature.

18.1.2 Rhythms of lights (see S-4 – B-471.2)

If it is required to encode the rhythms of lights, this must be done using the attributes LITCHR and SIGGRP.

The use of these attributes is defined in the following table; it contains the most common examples of coding; other coding combinations are possible:

Rhythms of lights	F	Oc	Oc(2)	Oc(2+3)	Iso	Fl	Fl(3)	LFl
LITCHR	*1*	*8*	*8*	*8*	*7*	*2*	*2*	*3*
SIGGRP	*prohibited*	*(1)*	*(2)*	*(2+3)*	*(1)*	*(1)*	*(3)*	*(1)*

Rhythms of lights	Q	Q(3)	IQ	VQ	VQ(3)	IVQ	UQ	IUQ
LITCHR	*4*	*4*	*9*	*5*	*5*	*10*	*6*	*11*
SIGGRP	*(1)*	*(3)*	*( )*	*(1)*	*(3)*	*( )*	*(1)*	*( )*

Rhythms of lights	Mo(K)	FFl	Q(6)+LFl	VQ(6)+LFl	Al.WR	Al.Fl.WR	Al.Fl(2W+1R)	Al.Oc(4)WR
LITCHR	*12*	*13*	*25*	*26*	*28*	*19*	*19*	*17*
SIGGRP	*(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&Fl). When it is known that two separate features actually exist, they must be encoded as separate features, in this case two **LIGHTS** features, one with attribute LITCHR = *1* (fixed) and the other with LITCHR = *2* (flashing), and not as one **LIGHTS** with LITCHR = *13* (fixed and flashing).

18.1.3 Elevations of lights (see S-4 – B-471.6)

If it is required to encode the elevation of a light on a fixed structure, it must be done using the attribute HEIGHT.

If it is required to encode the height above the water surface of a light on a floating structure, it must be done using the attribute INFORM on the **LIGHTS** feature.

18.1.4 Night lights

If it is required to encode a night light, it must be done using a **LIGHTS** feature with attribute EXCLIT = *4* (night light).

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).

18.1.5 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).

18.1.6 Daytime lights (see S-4 – B-473.4)

If it is required to encode a daytime light, it must be done using attribute EXCLIT = *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 **LIGHTS** features sharing the same point spatial feature:

- one **LIGHTS** feature with EXCLIT = *2* (daytime light),
- one **LIGHTS** feature with EXCLIT = *4* (night light).

18.1.7 Fog lights (see S-4 – B-473.5)

If it is required to encode a fog light, it must be done using a **LIGHTS** feature, with attributes EXCLIT = *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 **LIGHTS** features sharing the same point spatial feature:

- one **LIGHTS** object with EXCLIT = *3* (fog light) and STATUS = *2* (occasional)
- one **LIGHTS** object with EXCLIT = *2* (daytime light) or *4* (night light) and attribute INFORM = *Character of the light changes in fog*.

18.1.8 Sector lights (see S-4 – B-475.1 to B-475.5)

Each sector in which the light is visible from seaward must be encoded as one **LIGHTS** feature.

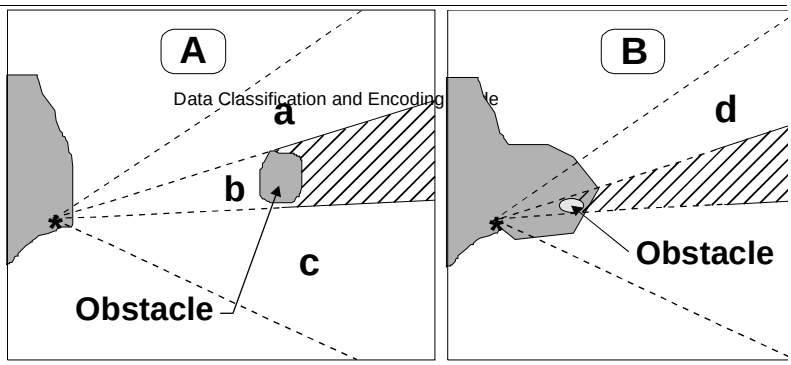
There must not be a feature created to encode a sector where no light is exhibited.

Limits of sectors must be encoded using attributes SECTR1 and SECTR2.

18.1.9 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 below) beyond an offshore obstruction, it must be encoded as several **LIGHTS** features. The partially obscured sector of (b), seaward of the island, must be encoded as a **LIGHTS** feature, with attributes LITVIS = *8* (partially obscured) and INFORM = *Sector obscured only beyond …..* The sectors in which the light is visible from seaward ((a) and (c)) must be encoded as separate **LIGHTS** features.

If there is no navigable water between the light and the obstacle (see Figure B below), the masked sector must be encoded as a **LIGHTS** feature, with LITVIS = *3* (faint) or *7* (obscured).



Obscured light sectors

18.1.10 White fairway sectors (see S-4 – B-475.5)

The light sectors must be encoded as separate **LIGHTS** features. The fairway defined navigable areas in the white sectors may be encoded using the feature **FAIRWY** (see clau

18.1.11 Oscillating light sectors

Evolving technology in the development of navigational lights has resulted in the in directional navigation lights with multiple sectors, colours and characteristics, some with many areas where navigation is restricted. These lights may have up to 7 sectors, with th a very narrow, sometimes intensified, fixed white sector performing the directional functi IALA A System, the sectors flanking this directional light may be alternating and oscill white to green (to starboard) and red (to port) with increasing deviation from the track defi light. These lights will normally be flanked by narrow sectors of fixed green (to starboa Additionally, there may be outer sectors that are occulting green (to starboard) and red (t with increasing period of eclipse to isophased or flashing with increasing deviation from th directional light. For the IALA B System the colours are reversed. In some cases these c 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 as follows:

For lights in the IALA A system that are alternating and oscillate increasingly from white t and red (to port) with increasing deviation from the track defined by the directional light:

LIGHTS: LITCHR = *28* (Alternating); COLOUR = *1,2* (White, Red); SECTR1; SECTR INFORM = *White phase decreases as bearing to light increases*

LIGHTS: LITCHR = *28* (Alternating); COLOUR = *1,4* (White, Green); SECTR1; SECTF SIGGRP; INFORM = *White phase increases as bearing to light increases*

For lights in the IALA B system that are alternating and oscillate increasingly from white and green (to port) with increasing deviation from the track defined by the directiona 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 increasing period of eclipse to isophased or flashing with increasing deviation from the directional light:

LIGHTS: LITCHR = *8* (Occulting); COLOUR = *3* (Red); SECTR1; SECTR2; SIGPER; *Light phase decreases as bearing to light increases*

LIGHTS: LITCHR= *8* (Occulting); COLOUR = *4* (Green); SECTR1; SECTR2; SIGPER; *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 increasing period of eclipse to isophased or flashing with increasing deviation from 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 ins contains white sectors that are occulting and oscillate with increasing period of eclipse to with increasing deviation from the track defined by the directional light:

For the sector to port of the track defined by the directional light:

LIGHTS: LITCHR = *8* (Occulting); COLOUR = *1* (White); SECTR1; SECTR2; SIGPE = *Light phase decreases as bearing to light increases*

For the sector to starboard of the track defined by the directional light:

LIGHTS: LITCHR= *8* (Occulting); COLOUR = *1* (White); SECTR1; SECTR2; SIGPER; *Light phase increases as bearing to light increases*

Comment [j258]: ENC EB No. 26.

Comment [j259]: ENC EB No. XX.

Comment [j260]: ENC EB No. XX.

Comment [j261]: ENC EB No. XX.

Comment [j262]: ENC EB No. XX.

Comment [j263]: ENC EB No. XX.

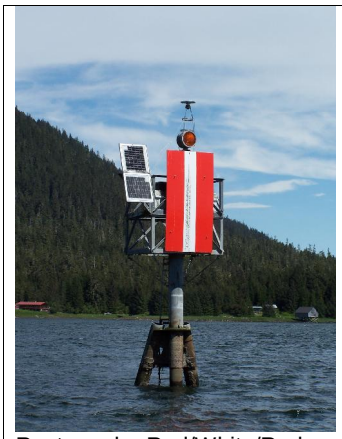
19 Buoys, Beacons

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; 1248).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World  Triangular Red Dayboard *Photograph, courtesy of the Pacific Hydrographic Branch*  Square Green Dayboard *Photograph, courtesy of the Pacific Hydrographic Branch*	**DAYMAR** (P)	CATSPM (O) Category of special purpose mark	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 33 : berthing permitted mark 34 : overhead power cable mark 35 : channel edge gradient' mark 36 : telephone mark 37 : ferry crossing mark 39 : pipeline mark	L

Comment [j264]: MD8 – 7.Co.10.

 Rectangular Red/White/Red Dayboard *Photograph, courtesy of the Pacific Hydrographic Branch*  Junction Green/Red/Green Dayboard *Photograph, courtesy of the Pacific Hydrographic Branch*  Warning White/Orange Dayboard *Photograph, courtesy of the Pacific Hydrographic Branch* *Paper Chart Symbol*			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 : GPS 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 (M) 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	L
		COLPAT (m) Colour pattern	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) ~~6 : border stripe~~	E
		NATCON (O) Nature of construction	~~1 : masonry~~ ~~2 : concreted~~ ~~3 : loose boulders~~ ~~4 : hard surfaced~~ ~~5 : unsurfaced~~ 6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted	L
		OBJNAM (O) Object name		S
		STATUS (O) Status	~~1 : permanent~~ ~~2 : occasional~~ ~~3 : recommended~~ ~~4 : not in use~~	L

Comment [j265]: S-57 Extension 06/01.

ECDIS Symbol			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~~	
		TOPSHP (M) Topmark/day mark shape	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 31 : rhombus over a circle 32 : circle over a triangle pointing up 33 : other shape (see INFORM)	E

Comment [j266]: S-57 Extension 06/01.

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.

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, Edition 5; 5309)**.**

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 Seeschiffahrt und Hydrographie, Germany).

4) **Degaussing range mark**

   IHO Definition: A mark used to indicate a degaussing range.

5) **Barge mark**

   IHO Definition: A mark of relevance to barges.

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.

7) **Spoil ground mark**

   IHO Definition: A mark used to indicate the limit of a spoil ground. (Adapted from IHO Dictionary – S-32, Edition 5; 4931).

8) **Outfall mark**

   IHO Definition: A mark used to indicate the position of an outfall or the point at which it leaves the land.

9) **ODAS**

   IHO Definition: Ocean Data Acquisition System. (IHO Dictionary – S-32, Edition 5; 5953).

10) **Recording mark**

    IHO Definition: A mark used to record data for scientific purposes.

11) **Seaplane anchorage mark**

    IHO Definition: A mark used to indicate a seaplane anchorage.

12) **Recreation zone mark**

    IHO Definition: A mark used to indicate a recreation zone.

14) **Mooring mark**

    IHO Definition: A mark indicating a mooring or moorings.

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, Edition 5; 2656).

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, Edition 5; 2697).

17) **Measured distance mark**

    IHO Definition: A mark forming part of a transit indicating one end of a measured distance.

18) **Notice mark**

IHO Definition: A notice board or sign indicating information to the mariner.

19) **TSS Mark**

IHO Definition: A mark indicating a Traffic Separation Scheme.

20) **Anchoring prohibited mark**

IHO Definition: A mark indicating an anchoring prohibited area.

21) **Berthing prohibited mark**

IHO Definition: A mark indicating that berthing is prohibited.

22) **Overtaking prohibited mark**

IHO Definition: A mark indicating that overtaking is prohibited.

23) **Two-way traffic prohibited mark**

IHO Definition: A mark indicating a one-way route.

24) **"Reduced wake" mark**

IHO Definition: A mark indicating that vessels must not generate excessive wake.

25) **Speed limit mark**

IHO Definition: A mark indicating that a speed limit applies.

26) **Stop mark**

IHO Definition: A mark indicating the place where the bow of a ship must stop when traffic lights show red.

27) **General warning mark**

IHO Definition: A mark indicating that special caution must be exercised in the vicinity of the mark.

28) **"Sound ship's siren" mark**

IHO Definition: A mark indicating that a ship should sound its siren or horn.

29) **Restricted vertical clearance mark**

IHO Definition: A mark indicating the minimum vertical space available for passage.

30) **Maximum vessel's draught mark**

IHO Definition: A mark indicating the maximum draught of vessel permitted.

31) **Restricted horizontal clearance mark**

IHO Definition: A mark indicating the minimum horizontal space available for passage.

32) **Strong current warning mark**

IHO Definition: A mark warning of strong currents.

33) **Berthing permitted mark**

IHO Definition: A mark indicating that berthing is allowed.

34) **Overhead power cable mark**

IHO Definition: A mark indicating an overhead power cable.

35) **"Channel edge gradient" mark**

IHO Definition: A mark indicating the gradient of the slope of a dredge channel edge.

36) **Telephone mark**

IHO Definition: A mark indicating the presence of a telephone.

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.

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.

40) **Anchorage mark**

IHO Definition: A mark indicating an anchorage area.

41) **Clearing mark**

IHO Definition: A mark used to indicate a clearing line.

42) **Control mark**

IHO Definition: A mark indicating the location at which a restriction or requirement exists.

43) **Diving mark**

IHO Definition: A mark indicating that diving may take place in the vicinity.

44) **Refuge beacon**

IHO Definition: A mark providing or indicating a place of safety.

45) **Foul ground mark**

IHO Definition: A mark indicating a foul ground.

46) **Yachting mark**

IHO Definition: A mark installed for use by yachtsmen.

47) **Heliport mark**

IHO Definition: A mark indicating an area where helicopters may land.

48) **GPS mark**

IHO Definition: A mark indicating a location at which a GPS position has been accurately determined.

49) **Seaplane landing mark**

IHO Definition: A mark indicating an area where sea-planes land.

50) **Entry prohibited mark**

IHO Definition: A mark indicating that entry is prohibited.

51) **Work in progress mark**

IHO Definition: A mark indicating that work (generally construction) is in progress.

52) **Mark with unknown purpose**

IHO Definition: A mark whose detailed characteristics are unknown.

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, Edition 5; 5971).

54) **Channel separation mark**

IHO Definition: A mark indicating the point at which a channel divides separately into two channels.

55) **Marine farm mark**

IHO Definition: A mark indicating the existence of a fish, mussel, oyster or pearl farm/ culture.

56) **Artificial reef mark**

IHO Definition: A mark indicating the existence or the extent of an artificial reef.

57) **Ice mark**

IHO Definition: A mark, used year round, that may be submerged when ice passes through the area.

Comment [j267]: S-57 Extension 06/01.

Remarks:

- A mark may be a beacon, a buoy, a signpost or may take another form.

Topmak/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).

1) **Cone, point up**

IHO Definition: Is where the vertex points up.

2) **Cone, point down**

IHO Definition: Is where the vertex points down.

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).

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).

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).

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.

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.

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 "+".

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.

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.

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, Edition 5; 3734). 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, Edition 5; 3734). 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.

18) **Sphere over rhombus**

IHO Definition: A sphere located above a rhombus.

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.

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.

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.

28) **T-shape**

IHO Definition: Having a shape like the capital letter T.

29) **Triangle pointing up over a circle**

IHO Definition: A triangle, vertex uppermost, located above a circle.

30) **Upright cross over a circle**

IHO Definition: An upright cross located above a circle.

31) **Rhombus over circle**

IHO Definition: A rhombus located above a circle.

32) **Circle over a triangle pointing up**

IHO Definition: A circle located over a triangle, vertex uppermost.

INT 1 Reference: Q 101

19.1.1 Daymarks

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

Geo feature:	Daymark (**DAYMAR**)					
Attributes:	CATSPM	COLOUR	COLPAT	DATEND	DATSTA	ELEVAT
	HEIGHT	NATCON	NOBJNM	OBJNAM	PEREND	PERSTA
	STATUS	TOPSHP	VERLEN	INFORM	NINFOM	NTXTDS
	SCAMIN	TXTDSC	RECDAT	RECIND	SORDAT	SORIND

Remarks:

- If it is required to encode the attributes ELEVAT, HEIGHT and VERLEN for a daymark, this must be done as described in clause X.X.

Distinction: Beacon, lateral; beacon, safe water; beacon, isolated danger; beacon, cardinal; 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, Edition 5; 565).

A lateral buoy is used to indicate the port or starboard hand side of the route to be followed. They are generally used for well defined channels and are used in conjunction with a conventional direction of buoyage. (UKHO NP 735, 5th Edition).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World  Green Can Buoy *Photograph, courtesy of the Atlantic Hydrographic Branch*  Green Barrel Buoy *Photograph, courtesy of the Pacific Hydrographic Branch*  Green Pillar Buoy *Photograph, courtesy of the Pacific Hydrographic Branch*	**BOYLAT** (P)	BOYSHP (M) Buoy shape	1 : conical (nun, ogival) 2 : can (cylindrical) 3 : spherical 4 : pillar 5 : spar (spindle) 6 : barrel (tun) 7 : super-buoy 8 : ice buoy	E
		CATLAM (M) Category of lateral mark	1 : port-hand lateral mark 2 : starboard-hand lateral mark 3 : preferred channel to starboard lateral mark 4 : preferred channel to port lateral mark	E
		COLOUR (M) 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	L
		COLPAT (m) Colour pattern	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) ~~6 : border stripe~~	E
		CONRAD (O) Conspicuous, radar	1 : radar conspicuous ~~2 : not radar conspicuous~~ 3 : radar conspicuous (has radar reflector)	E
		NATCON (O) Nature of construction	~~1 : masonry~~ ~~2 : concreted~~ ~~3 : loose boulders~~ ~~4 : hard surfaced~~	L

 Red Conical/Nun Buoy *Photograph, courtesy of the Pacific Hydrographic Branch*  Red Pillar Buoy *Photograph, courtesy of the Pacific Hydrographic Branch* *Paper Chart Symbol* *ECDIS Symbol*			~~5 : unsurfaced~~ 6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted	
		OBJNAM (O) Object name		S
		STATUS (O) 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~~	L

Comment [j268]: S-57 Extension 06/01.

Buoy shape: IHO Definition:

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.

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.

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.

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.

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.

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.

7) **Super-buoy**

IHO Definition: A very large buoy, generally more than 5m in diameter.

8) **Ice buoy**

IHO Definition: A specially constructed shuttle shaped buoy which is used in ice conditions.

Remarks:

- The principal shapes are those recommended in the International Association of Lighthouse Authorities - IALA System.

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".

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".

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.

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.

Remarks:

- There are two international buoyage regions, A and B, between which lateral marks differ. The buoyage region is encoded using the separate attribute MARSYS. 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.

Colour pattern: IHO Definition:

1) **Horizontal stripes**

IHO Definition: Straight bands or stripes of differing colours painted horizontally.

2) **Vertical stripes**

IHO Definition: Straight bands or stripes of differing colours painted vertically.

3) **Diagonal stripes**

IHO Definition: Straight bands or stripes of differing colours painted diagonally (i.e. not horizontally or vertically).

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.

5) **Stripes (direction unknown)**

IHO Definition: Straight bands or stripes of differing colours painted in an unknown direction.

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.

INT 1 Reference: Q 130.1

19.2.1 Lateral buoys

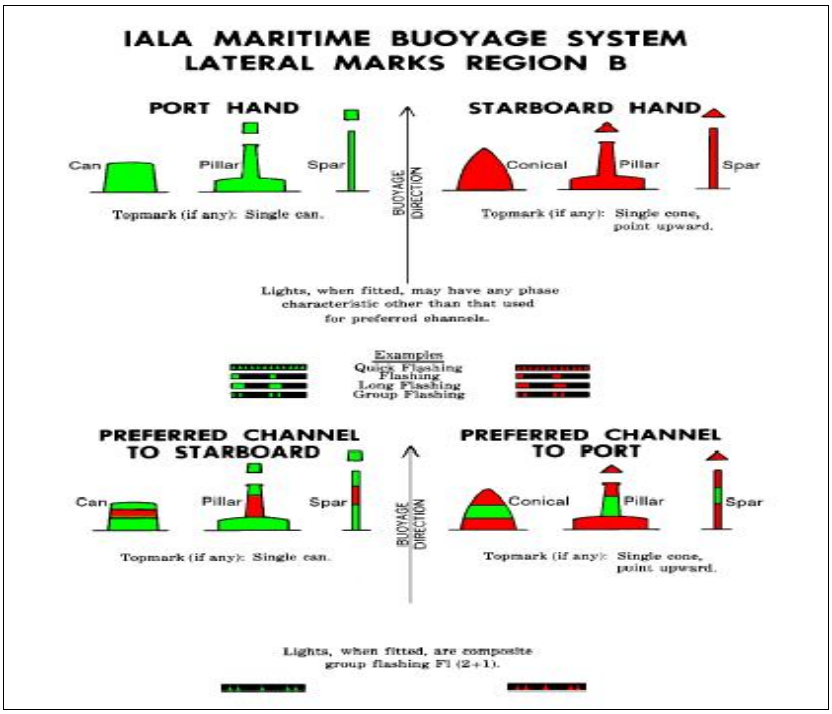
Geo feature: Buoy, Lateral (**BOYLAT**)

Attributes:

BOYSHP	CATLAM	COLOUR	COLPAT	CONRAD	DATEND
DATSTA	MARSYS	NATCON	NOBJNM	OBJNAM	PEREND
PERSTA	STATUS	VERLEN	INFORM	NINFOM	NTXTDS
PICREP	SCAMIN	TXTDSC	RECDAT	RECIND	SORDAT
SORIND					

Remarks:

- If it is required to encode the total vertical length, including any equipment features (e.g. topmark, light), of the buoy above the water level, it must be done using the attribute VERLEN.
- If it is required to encode a buoy that has more than one colour, the attributes COLOUR and COLPAT must be encoded, according to the rules laid out in clause X.X.



Distinction: Buoy, cardinal; buoy, safe water; buoy, isolated danger; buoy, special purpose/general; mooring/warping facility.

19.3 Isolated danger buoys

IHO Definition: **BUOY, ISOLATED DANGER**. 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, Edition 5; 565).

An isolated danger buoy is a buoy moored on or above an isolated danger of limited extent, which has navigable water all around it. (UKHO NP 735, 5th Edition).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol*	**BOYISD** (P)	BOYSHP (M) Buoy shape	1 : conical (nun, ogival) 2 : can (cylindrical) 3 : spherical 4 : pillar 5 : spar (spindle) 6 : barrel (tun) 7 : super-buoy 8 : ice buoy	E
ECDIS Symbol		COLOUR (M) 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	L
		COLPAT (m) Colour pattern	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) ~~6 : border stripe~~	E
		CONRAD (O) Conspicuous, radar	1 : radar conspicuous ~~2 : not radar conspicuous~~ 3 : radar conspicuous (has radar reflector)	E
		NATCON (O) Nature of construction	~~1 : masonry~~ ~~2 : concreted~~ ~~3 : loose boulders~~ ~~4 : hard surfaced~~ ~~5 : unsurfaced~~ 6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted	L
		OBJNAM (O)		S

		Object name		
		STATUS (O) 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~~	L

Comment [j269]: S-57 Extension 06/01.

Buoy shape: IHO Definition:

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.

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.

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.

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.

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.

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.

7) **Super-buoy**

   IHO Definition: A very large buoy, generally more than 5m in diameter.

8) **Ice buoy**

   IHO Definition: A specially constructed shuttle shaped buoy which is used in ice conditions.

Remarks:

- The principal shapes are those recommended in the International Association of Lighthouse Authorities - IALA System.

Colour pattern: IHO Definition:

1) **Horizontal stripes**

   IHO Definition: Straight bands or stripes of differing colours painted horizontally.

2) **Vertical stripes**

   IHO Definition: Straight bands or stripes of differing colours painted vertically.

3) **Diagonal stripes**

   IHO Definition: Straight bands or stripes of differing colours painted diagonally (i.e. not horizontally or vertically).

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.

5) **Stripes (direction unknown)**

   IHO Definition: Straight bands or stripes of differing colours painted in an unknown direction.

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.

INT 1 Reference: Q 130.4

19.3.1 Isolated danger buoys

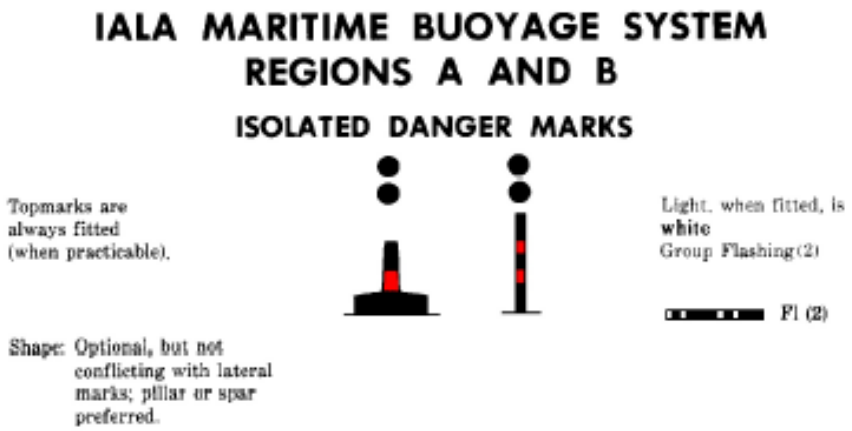
Geo feature: Buoy isolated danger (**BOYISD**)

Attributes:

BOYSHP	COLOUR	COLPAT	CONRAD	DATEND	DATSTA
MARSYS	NATCON	NOBJNM	OBJNAM	PEREND	PERSTA
STATUS	VERDAT	VERLEN	INFORM	NINFOM	NTXTDS
PICREP	SCAMIN	TXTDSC	RECDAT	RECIND	SORDAT
SORIND					

Remarks:

- If it is required to encode the total vertical length, including any equipment features (e.g. topmark, light), of the buoy above the water level, it must be done using the attribute VERLEN.
- If it is required to encode a buoy that has more than one colour, the attributes COLOUR and COLPAT must be encoded, according to the rules laid out in clause X.X.



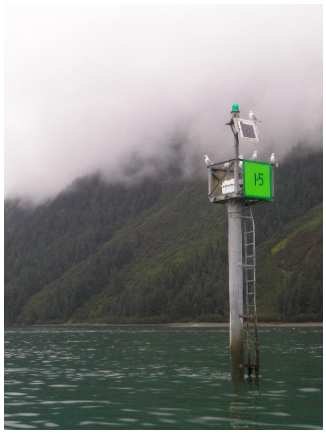
Distinction: Buoy, lateral; buoy, safe water; buoy, isolated danger; buoy, special purpose/general;

mooring/warping facility.

19.4 Lateral beacons

IHO Definition: **BEACON**. 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, Edition 5; 420).

A lateral beacon is used to indicate the port or starboard hand side of the route to be followed. They are generally used for well defined channels and are used in conjunction with a conventional direction of buoyage. (UKHO NP 735, 5th Edition).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World  Unlighted Green Lateral Beacon *Photograph, courtesy of the Pacific Hydrographic Branch*	**BCNLAT** (P)	BCNSHP (M) Beacon shape	1 : stake, pole, perch, post 2 : withy 3 : beacon tower 4 : lattice beacon 5 : pile beacon 6 : cairn 7 : buoyant beacon	E
		CATLAM (M) Category of lateral mark	1 : port-hand lateral mark 2 : starboard-hand lateral mark 3 : preferred channel to starboard lateral mark 4 : preferred channel to port lateral mark	E
 Lighted Green Lateral Beacon *Photograph, courtesy of the Pacific Hydrographic Branch*		COLOUR (M) 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	L
		COLPAT (m) Colour pattern	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) ~~6 : border stripe~~	E
 Unlighted Red Lateral Beacon *Photograph, courtesy of the Pacific*		CONDTN (O) Condition	1 : under construction 2 : ruined ~~3 : under reclamation~~ ~~4 : wingless~~ ~~5 : planned construction~~	E
		CONRAD (O) Conspicuous, radar	1 : radar conspicuous ~~2 : not radar conspicuous~~ 3 : radar conspicuous (has radar	E

Hydrographic Branch  Lighted Red Lateral Beacon *Photograph, courtesy of the Pacific Hydrographic Branch*  Lighted Green and Red Junction Beacon *Photograph, courtesy of the Pacific Hydrographic Branch* *Paper Chart Symbol* *ECDIS Symbol*			reflector)	
		CONVIS (O) Conspicuous, visually	1: visually conspicuous ~~2: not visually conspicuous~~	E
		NATCON (O) Nature of construction	~~1 : masonry~~ 2 : concreted 3 : loose boulders ~~4 : hard surfaced~~ ~~5 : unsurfaced~~ 6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted	L
		OBJNAM (O) Object name		S
		STATUS (O) 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~~	L

Comment [j270]: S-57 Extension 06/01.

Beacon Shape: IHO Definition:

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, Edition 5; 4960).

2) **Withy**

   IHO Definition: A tree without roots stuck or spoiled into the bottom of the sea to serve as a navigational aid.

3) **Beacon tower**

   IHO Definition: A solid structure of the order of 10 metres in height used as a navigational aid.

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.

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, Edition 5; 3840 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, Edition 5; 601).

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. (IHO Specifications, M-4, 459.1).

Remarks:

- The beacon shape describes the characteristic geometric form of the beacon.

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".

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".

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.

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.

Remarks:

- There are two international buoyage regions, A and B, between which lateral marks differ. The buoyage region is encoded using the separate attribute MARSYS. 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.

Colour pattern: IHO Definition:

1) **Horizontal stripes**

IHO Definition: Straight bands or stripes of differing colours painted horizontally.

2) **Vertical stripes**

IHO Definition: Straight bands or stripes of differing colours painted vertically.

3) **Diagonal stripes**

IHO Definition: Straight bands or stripes of differing colours painted diagonally (i.e. not horizontally or vertically).

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.

5) **Stripes (direction unknown)**

IHO Definition: Straight bands or stripes of differing colours painted in an unknown direction.

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.

INT 1 Reference: Q 91-92, 130.1

19.4.1 Lateral Beacons

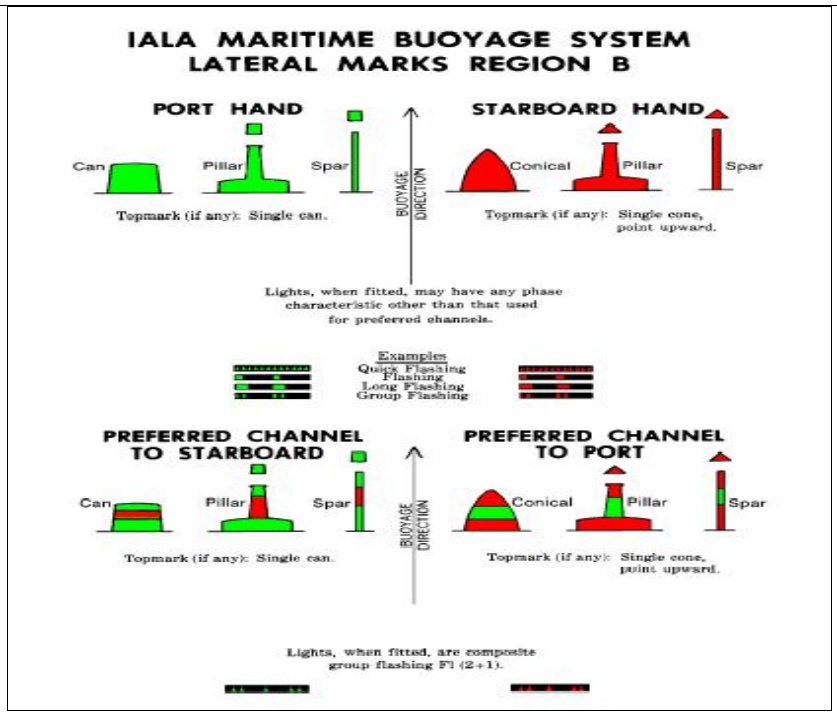
Geo feature: Beacon lateral (**BCNLAT**)

Attributes:

BCNSHP	CATLAM	COLOUR	COLPAT	CONDTN	CONRAD
CONVIS	DATEND	DATSTA	ELEVAT	HEIGHT	MARSYS
NATCON	NOBJNM	OBJNAM	PEREND	PERSTA	STATUS
VERLEN	INFORM	NINFOM	NTXTDS	PICREP	SCAMIN
TXTDSC	RECDAT	RECIND	SORDAT	SORIND	

Remarks:

- 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 ELEVAT, but only for beacons built on land.
- If it is required to encode the total altitude of a beacon, including any equipment features (e.g. topmark, 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 any equipment features (e.g. topmark, light), above the seabed or ground, it must be done using the attribute VERLEN.
- 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 beacon that has more than one colour, the attributes COLOUR and COLPAT must be encoded, according to the rules laid out in clause X.X.



Distinction: Daymark; beacon, cardinal; beacon, safe water; beacon, isolated danger; beacon, special purpose/general.

19.5 Special purpose/general beacons

IHO Definition: **BEACON**. 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, Edition 5; 420).

A special purpose beacon is primarily used to indicate an area or feature, the nature of which is apparent from reference to a chart, Sailing Directions or Notices to Mariners. (UKHO NP 735, 5th Edition).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World  Lighted Red/White/Red Range Beacon *Photograph, courtesy of the Pacific Hydrographic Branch*  Lighted Warning Beacon *Photograph, courtesy of the Pacific Hydrographic Branch*  Unlighted White/Orange Warning Beacon *Photograph, courtesy of the Pacific Hydrographic Branch*	**BCNSPP** (P)	BCNSHP (M) Beacon shape	1 : stake, pole, perch, post 2 : withy 3 : beacon tower 4 : lattice beacon 5 : pile beacon 6 : cairn 7 : buoyant beacon	E
		CATSPM (M) Category of special purpose mark	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	L

Comment [j271]: MD8 – 7.Co.10.

 Sign *Photograph, courtesy of the Atlantic Hydrographic Branch* *Paper Chart Symbol* *ECDIS Symbol*			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 : GPS 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 (M) 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	L
		COLPAT (m) Colour pattern	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) ~~6 : border stripe~~	E
		CONDTN (O) Condition	1 : under construction 2 : ruined ~~3 : under reclamation~~ ~~4 : wingless~~ ~~5 : planned construction~~	E
		CONRAD (O) Conspicuous, radar	1 : radar conspicuous ~~2 : not radar conspicuous~~ 3 : radar conspicuous (has radar reflector)	E
		CONVIS (O)	1: visually conspicuous	E

Comment [j272]: S-57 Extension 06/01.

		Conspicuous, visually	~~2: not visually conspicuous~~	
		NATCON (O) Nature of construction	~~1 : masonry~~ 2 : concreted 3 : loose boulders ~~4 : hard surfaced~~ ~~5 : unsurfaced~~ 6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted	L
		OBJNAM (O) Object name		S
		STATUS (O) 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~~	L

Comment [j273]: S-57 Extension 06/01.

Beacon Shape: IHO Definition:

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, Edition 5; 4960).

2) **Withy**

   IHO Definition: A tree without roots stuck or spoiled into the bottom of the sea to serve as a navigational aid.

3) **Beacon tower**

   IHO Definition: A solid structure of the order of 10 metres in height used as a navigational aid.

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.

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, Edition 5; 3840 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, Edition 5; 601).

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. (IHO Specifications, M-4, 459.1).

Remarks:

- The beacon shape describes the characteristic geometric form of the beacon.

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.

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, Edition 5; 5309)**.**

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 Seeschiffahrt und Hydrographie, Germany).

4) **Degaussing range mark**

IHO Definition: A mark used to indicate a degaussing range.

5) **Barge mark**

IHO Definition: A mark of relevance to barges.

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.

7) **Spoil ground mark**

IHO Definition: A mark used to indicate the limit of a spoil ground. (Adapted from IHO Dictionary – S-32, Edition 5; 4931).

8) **Outfall mark**

IHO Definition: A mark used to indicate the position of an outfall or the point at which it leaves the land.

9) **ODAS**

IHO Definition: Ocean Data Acquisition System. (IHO Dictionary – S-32, Edition 5; 5953).

10) **Recording mark**

IHO Definition: A mark used to record data for scientific purposes.

11) **Seaplane anchorage mark**

IHO Definition: A mark used to indicate a seaplane anchorage.

12) **Recreation zone mark**

IHO Definition: A mark used to indicate a recreation zone.

14) **Mooring mark**

IHO Definition: A mark indicating a mooring or moorings.

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, Edition 5; 2656).

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, Edition 5; 2697).

17) **Measured distance mark**

IHO Definition: A mark forming part of a transit indicating one end of a measured distance.

18) **Notice mark**

IHO Definition: A notice board or sign indicating information to the mariner.

19) **TSS Mark**

IHO Definition: A mark indicating a Traffic Separation Scheme.

20) **Anchoring prohibited mark**

IHO Definition: A mark indicating an anchoring prohibited area.

21) **Berthing prohibited mark**

IHO Definition: A mark indicating that berthing is prohibited.

22) **Overtaking prohibited mark**

IHO Definition: A mark indicating that overtaking is prohibited.

23) **Two-way traffic prohibited mark**

IHO Definition: A mark indicating a one-way route.

24) **"Reduced wake" mark**

IHO Definition: A mark indicating that vessels must not generate excessive wake.

25) **Speed limit mark**

IHO Definition: A mark indicating that a speed limit applies.

26) **Stop mark**

IHO Definition: A mark indicating the place where the bow of a ship must stop when traffic lights show red.

27) **General warning mark**

IHO Definition: A mark indicating that special caution must be exercised in the vicinity of the mark.

28) **"Sound ship's siren" mark**

IHO Definition: A mark indicating that a ship should sound its siren or horn.

29) **Restricted vertical clearance mark**

IHO Definition: A mark indicating the minimum vertical space available for passage.

30) **Maximum vessel's draught mark**

IHO Definition: A mark indicating the maximum draught of vessel permitted.

31) **Restricted horizontal clearance mark**

IHO Definition: A mark indicating the minimum horizontal space available for passage.

32) **Strong current warning mark**

IHO Definition: A mark warning of strong currents.

33) **Berthing permitted mark**

IHO Definition: A mark indicating that berthing is allowed.

34) **Overhead power cable mark**

IHO Definition: A mark indicating an overhead power cable.

35) **"Channel edge gradient" mark**

IHO Definition: A mark indicating the gradient of the slope of a dredge channel edge.

36) **Telephone mark**

IHO Definition: A mark indicating the presence of a telephone.

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.

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.

40) **Anchorage mark**

IHO Definition: A mark indicating an anchorage area.

41) **Clearing mark**

IHO Definition: A mark used to indicate a clearing line.

42) **Control mark**

IHO Definition: A mark indicating the location at which a restriction or requirement exists.

43) **Diving mark**

IHO Definition: A mark indicating that diving may take place in the vicinity.

44) **Refuge beacon**

IHO Definition: A mark providing or indicating a place of safety.

45) **Foul ground mark**

IHO Definition: A mark indicating a foul ground.

46) **Yachting mark**

IHO Definition: A mark installed for use by yachtsmen.

47) **Heliport mark**

IHO Definition: A mark indicating an area where helicopters may land.

48) **GPS mark**

IHO Definition: A mark indicating a location at which a GPS position has been accurately determined.

49) **Seaplane landing mark**

IHO Definition: A mark indicating an area where sea-planes land.

50) **Entry prohibited mark**

IHO Definition: A mark indicating that entry is prohibited.

51) **Work in progress mark**

IHO Definition: A mark indicating that work (generally construction) is in progress.

52) **Mark with unknown purpose**

IHO Definition: A mark whose detailed characteristics are unknown.

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, Edition 5; 5971).

54) **Channel separation mark**

IHO Definition: A mark indicating the point at which a channel divides separately into two channels.

55) **Marine farm mark**

IHO Definition: A mark indicating the existence of a fish, mussel, oyster or pearl farm/ culture.

56) **Artificial reef mark**

IHO Definition: A mark indicating the existence or the extent of an artificial reef.

57) **Ice mark**

IHO Definition: A mark, used year round, that may be submerged when ice passes through the area.

Comment [j274]: S-57 Extension 06/01.

Remarks:

- A mark may be a beacon, a buoy, a signpost or may take another form.

INT 1 Reference: Q 130.6

19.5.1 Special purpose/general beacons

Geo feature: Beacon, Special purpose/general (**BCNSPP**)

Attributes:

BCNSHP	CATSPM	COLOUR	COLPAT	CONDTN	CONRAD
CONVIS	DATEND	DATSTA	ELEVAT	HEIGHT	MARSYS
NATCON	NOBJNM	OBJNAM	PEREND	PERSTA	STATUS
VERLEN	INFORM	NINFOM	NTXTDS	PICREP	SCAMIN
TXTDSC	RECDAT	RECIND	SORDAT	SORIND	

Remarks:

- 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 ELEVAT, but only for beacons built on land.
- If it is required to encode the total altitude of a beacon, including any equipment features (e.g. topmark, 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 any equipment features (e.g. topmark, light), above the seabed or ground, it must be done using the attribute VERLEN.
- 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 beacon that has more than one colour, the attributes COLOUR and COLPAT must be encoded, according to the rules laid out in clause X.X.

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	BCNSHP	CATSPM	Other attributes
Minor not permanent mark	Q90	**BCN*****	*1*		
	Q91	**BCNLAT**	*1*	/	

	Q92	**BCNLAT**	*2*	*/*	
Cairn	Q100	**BCN*****	*6*		
Coloured or white mark	Q101	**DAYMAR**	*/*		NATCON = *9*
Coloured topmark with function of beacon	Q102.1	**DAYMAR**	*/*		NATCON = *9*
Painted board with function of leading beacon	Q102.2	**DAYMAR**	*/*	*16*	NATCON = *9*, TOPSHP = *6*
Beacon tower	Q110	**BCN*****	*3*		
Lattice beacon	Q111	**BCN*****	*4*		
Leading beacon	Q120	**BCNSPP**		*16*	
Beacon marking a clearing line	Q121	**BCNSPP**		*41*	
Beacon marking measured distance	Q122	**BCNSPP**		*17*	
Cable landing beacon	Q123	**BCNSPP**		*6*	
Outfall landing beacon	Q123	**BCNSPP**		*8*	
Pipeline landing beacon	Q123	**BCNSPP**		*39*	
Refuge beacon	Q124	**BCNSPP**		*44*	
Firing practice area beacon	Q125	**BCNSPP**		*1*	
Notice board	Q126	**BCNSPP**		*18*	
Buoyant beacon	P5	**BCN*****	*7*		

Distinction: Daymark; beacon, lateral; beacon, safe water; beacon, isolated danger; beacon, cardinal.

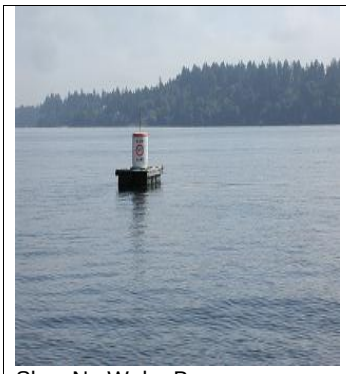
19.6 Special purpose/general buoys

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, Edition 5; 565).

A special purpose buoy is primarily used to indicate an area or feature, the nature of which is apparent from reference to a chart, Sailing Directions or Notices to Mariners. (UKHO NP 735, 5th Edition).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World  White and Orange Warning Buoy *Photograph, courtesy of the Pacific Hydrographic Branch*  Lighted Yellow Special Purpose Buoy *Photograph, courtesy of the Pacific Hydrographic Branch*	**BOYSPP** (P)	BOYSHP (M) Buoy shape	1 : conical (nun, ogival) 2 : can (cylindrical) 3 : spherical 4 : pillar 5 : spar (spindle) 6 : barrel (tun) 7 : super-buoy 8 : ice buoy	E
		CATSPM (M) Category of special purpose mark	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	L

Comment [j275]: MD8 – 7.Co.10.

 Slow No Wake Buoy *Photograph, courtesy of the Atlantic Hydrographic Branch* *Paper Chart Symbol* *ECDIS Symbol*			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 : GPS 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 (M) 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	L
		COLPAT (m) Colour pattern	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) ~~6 : border stripe~~	E
		CONRAD (O) Conspicuous, radar	1 : radar conspicuous ~~2 : not radar conspicuous~~ 3 : radar conspicuous (has radar reflector)	E
		NATCON (O) Nature of construction	~~1 : masonry~~ ~~2 : concreted~~ ~~3 : loose boulders~~ ~~4 : hard surfaced~~ ~~5 : unsurfaced~~	L

Comment [j276]: S-57 Extension 06/01.

			6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted	
		OBJNAM (O) Object name		S
		STATUS (O) 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~~	L

Comment [j277]: S-57 Extension 06/01.

Buoy shape: IHO Definition:

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.

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.

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.

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.

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.

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.

7) **Super-buoy**

   IHO Definition: A very large buoy, generally more than 5m in diameter.

8) **Ice buoy**

IHO Definition: A specially constructed shuttle shaped buoy which is used in ice conditions.

Remarks:

- The principal shapes are those recommended in the International Association of Lighthouse Authorities - IALA System.

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.

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, Edition 5; 5309)**.**

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 Seeschiffahrt und Hydrographie, Germany).

4) **Degaussing range mark**

IHO Definition: A mark used to indicate a degaussing range.

5) **Barge mark**

IHO Definition: A mark of relevance to barges.

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.

7) **Spoil ground mark**

IHO Definition: A mark used to indicate the limit of a spoil ground. (Adapted from IHO Dictionary – S-32, Edition 5; 4931).

8) **Outfall mark**

IHO Definition: A mark used to indicate the position of an outfall or the point at which it leaves the land.

9) **ODAS**

IHO Definition: Ocean Data Acquisition System. (IHO Dictionary – S-32, Edition 5; 5953).

10) **Recording mark**

IHO Definition: A mark used to record data for scientific purposes.

11) **Seaplane anchorage mark**

IHO Definition: A mark used to indicate a seaplane anchorage.

12) **Recreation zone mark**

IHO Definition: A mark used to indicate a recreation zone.

14) **Mooring mark**

IHO Definition: A mark indicating a mooring or moorings.

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, Edition 5; 2656).

17) **Measured distance mark**

IHO Definition: A mark forming part of a transit indicating one end of a measured distance.

18) **Notice mark**

IHO Definition: A notice board or sign indicating information to the mariner.

19) **TSS Mark**

IHO Definition: A mark indicating a Traffic Separation Scheme.

20) **Anchoring prohibited mark**

IHO Definition: A mark indicating an anchoring prohibited area.

21) **Berthing prohibited mark**

IHO Definition: A mark indicating that berthing is prohibited.

22) **Overtaking prohibited mark**

IHO Definition: A mark indicating that overtaking is prohibited.

23) **Two-way traffic prohibited mark**

IHO Definition: A mark indicating a one-way route.

24) **"Reduced wake" mark**

IHO Definition: A mark indicating that vessels must not generate excessive wake.

25) **Speed limit mark**

IHO Definition: A mark indicating that a speed limit applies.

26) **Stop mark**

IHO Definition: A mark indicating the place where the bow of a ship must stop when traffic lights show red.

27) **General warning mark**

IHO Definition: A mark indicating that special caution must be exercised in the vicinity of the mark.

28) **"Sound ship's siren" mark**

IHO Definition: A mark indicating that a ship should sound its siren or horn.

29) **Restricted vertical clearance mark**

IHO Definition: A mark indicating the minimum vertical space available for passage.

30) **Maximum vessel's draught mark**

IHO Definition: A mark indicating the maximum draught of vessel permitted.

31) **Restricted horizontal clearance mark**

IHO Definition: A mark indicating the minimum horizontal space available for passage.

32) **Strong current warning mark**

IHO Definition: A mark warning of strong currents.

33) **Berthing permitted mark**

IHO Definition: A mark indicating that berthing is allowed.

34) **Overhead power cable mark**

IHO Definition: A mark indicating an overhead power cable.

35) **"Channel edge gradient" mark**

IHO Definition: A mark indicating the gradient of the slope of a dredge channel edge.

36) **Telephone mark**

IHO Definition: A mark indicating the presence of a telephone.

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.

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.

40) **Anchorage mark**

IHO Definition: A mark indicating an anchorage area.

41) **Clearing mark**

IHO Definition: A mark used to indicate a clearing line.

42) **Control mark**

IHO Definition: A mark indicating the location at which a restriction or requirement exists.

43) **Diving mark**

IHO Definition: A mark indicating that diving may take place in the vicinity.

44) **Refuge beacon**

IHO Definition: A mark providing or indicating a place of safety.

45) **Foul ground mark**

IHO Definition: A mark indicating a foul ground.

46) **Yachting mark**

IHO Definition: A mark installed for use by yachtsmen.

47) **Heliport mark**

IHO Definition: A mark indicating an area where helicopters may land.

48) **GPS mark**

IHO Definition: A mark indicating a location at which a GPS position has been accurately determined.

49) **Seaplane landing mark**

IHO Definition: A mark indicating an area where sea-planes land.

50) **Entry prohibited mark**

IHO Definition: A mark indicating that entry is prohibited.

51) **Work in progress mark**

IHO Definition: A mark indicating that work (generally construction) is in progress.

52) **Mark with unknown purpose**

IHO Definition: A mark whose detailed characteristics are unknown.

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, Edition 5; 5971).

54) **Channel separation mark**

IHO Definition: A mark indicating the point at which a channel divides separately into two channels.

55) **Marine farm mark**

IHO Definition: A mark indicating the existence of a fish, mussel, oyster or pearl farm/ culture.

56) **Artificial reef mark**

IHO Definition: A mark indicating the existence or the extent of an artificial reef.

57) **Ice mark**

IHO Definition: A mark, used year round, that may be submerged when ice passes through the area.

Comment [j278]: S-57 Extension 06/01.

Remarks:

- A mark may be a beacon, a buoy, a signpost or may take another form.

INT 1 Reference: Q 30.6

19.6.1 Special purpose/general buoys

Geo feature: Buoy, Special purpose/general (**BOYSPP**)

Attributes:

BOYSHP	CATSPM	COLOUR	COLPAT	CONDTN	CONRAD
CONVIS	DATEND	DATSTA	ELEVAT	HEIGHT	MARSYS
NATCON	NOBJNM	OBJNAM	PEREND	PERSTA	STATUS
VERLEN	INFORM	NINFOM	NTXTDS	PICREP	SCAMIN
TXTDSC	RECDAT	RECIND	SORDAT	SORIND	

Remarks:

- If it is required to encode the total vertical length, including any equipment features (e.g. topmark, light), of the buoy above the water level, it must be done using the attribute VERLEN.
- If it is required to encode a buoy that has more than one colour, the attributes COLOUR and COLPAT must be encoded, according to the rules laid out in clause X.X.

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 for BOYSPP objects.

Feature	INT1	Feature	BOYSHP	CATSPM	Other attributes
Firing danger area buoy	IQ50	**BOYSPP**		*1*	
Target	IQ51	**BOYSPP**		*2*	
Marker ship	IQ52	**BOYSPP**		*3*	
Barge	IQ53	**BOYSPP**		*5*	
Degaussing range buoy	IQ54	**BOYSPP**		*4*	
Buoy marking cable	IQ55	**BOYSPP**		*6*	
Spoil ground buoy	IQ56	**BOYSPP**		*7*	
Buoy marking outfall	IQ57	**BOYSPP**		*8*	
Buoy marking pipeline		**BOYSPP**		*39*	
Superbuoy	IQ26	**BOY*****	*7*		
Large automatic navigational buoy	IP6	**BOYSPP**	*7*	*15*	
Data-collecting buoy of superbuoy size	IQ58	**BOYSPP**	*7*	*9*	

Buoy marking wave recorder (or current meter)	IQ59	**BOYSPP**		*10*	INFORM = *wave recorder* (e.g.)
Seaplane anchorage buoy	IQ60	**BOYSPP**		*11*	
Buoy marking traffic separation scheme	IQ61	**BOYSPP**		*19*	
Buoy marking recreation zone	IQ62	**BOYSPP**		*12*	

Distinction: Buoy, lateral; buoy, safe water; buoy, isolated danger; buoy, cardinal; buoy, installation; mooring/warping facility.

19.7 Safe water buoys

IHO Definition: **BUOY, SAFE WATER**. 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, Edition 5; 565).

A safe water buoy is used to indicate that there is navigable water around the mark. (UKHO NP 735, 5th Edition).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol*	**BOYSAW** (P)	BOYSHP (M) Buoy shape	1 : conical (nun, ogival) 2 : can (cylindrical) 3 : spherical 4 : pillar 5 : spar (spindle) 6 : barrel (tun) 7 : super-buoy 8 : ice buoy	E
ECDIS Symbol		COLOUR (M) 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	L
		COLPAT (m) Colour pattern	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) ~~6 : border stripe~~	E
		CONRAD (O) Conspicuous, radar	1 : radar conspicuous ~~2 : not radar conspicuous~~ 3 : radar conspicuous (has radar reflector)	E
		NATCON (O) Nature of construction	~~1 : masonry~~ ~~2 : concreted~~ ~~3 : loose boulders~~ ~~4 : hard surfaced~~ ~~5 : unsurfaced~~ 6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted	L
		OBJNAM (O)		S

		Object name		
		STATUS (O) 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~~	L

Comment [j279]: S-57 Extension 06/01.

Buoy shape: IHO Definition:

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.

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.

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.

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.

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.

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.

7) **Super-buoy**

   IHO Definition: A very large buoy, generally more than 5m in diameter.

8) **Ice buoy**

   IHO Definition: A specially constructed shuttle shaped buoy which is used in ice conditions.

Remarks:

- The principal shapes are those recommended in the International Association of Lighthouse Authorities - IALA System.

Colour pattern: IHO Definition:

1) **Horizontal stripes**

   IHO Definition: Straight bands or stripes of differing colours painted horizontally.

2) **Vertical stripes**

   IHO Definition: Straight bands or stripes of differing colours painted vertically.

3) **Diagonal stripes**

   IHO Definition: Straight bands or stripes of differing colours painted diagonally (i.e. not horizontally or vertically).

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.

5) **Stripes (direction unknown)**

   IHO Definition: Straight bands or stripes of differing colours painted in an unknown direction.

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.

INT 1 Reference: Q 130.5

19.7.1 Safe water buoys

Geo feature: Buoy, safe water (**BOYSAW**)

Attributes:

BOYSHP	COLOUR	COLPAT	CONRAD	DATEND	DATSTA
MARSYS - only if different to the value encoded on meta feature **M_NSYS**					
NATCON	NOBJNM	OBJNAM	PEREND	PERSTA	STATUS
VERACC	VERLEN	INFORM	NINFOM	NTXTDS	PICREP
SCAMIN	TXTDSC	RECDAT	RECIND	SORDAT	SORIND

Remarks:

- If it is required to encode the total vertical length, including any equipment features (e.g. topmark, light), of the buoy above the water level, it must be done using the attribute VERLEN.
- If it is required to encode a buoy that has more than one colour, the attributes COLOUR and COLPAT must be encoded, according to the rules laid out in clause X.X.

Distinction: Buoy, lateral; buoy, safe water; buoy, isolated danger; buoy, cardinal; buoy, installation; 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, Edition 5; 565).

A cardinal buoy is used in conjunction with the compass to indicate where the mariner may find the best navigable water. It is placed in one of the four quadrants (North, East, South and West), bounded by inter-cardinal bearings from the point marked. (UKHO NP 735, 5th Edition).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol*	**BOYCAR** (P)	BOYSHP (M) Buoy shape	1 : conical (nun, ogival) 2 : can (cylindrical) 3 : spherical 4 : pillar 5 : spar (spindle) 6 : barrel (tun) 7 : super-buoy 8 : ice buoy	E
ECDIS Symbol		CATCAM (M) Category of cardinal mark	1 : north cardinal mark 2 : east cardinal mark 3 : south cardinal mark 4 : west cardinal mark	E
		COLOUR (M) 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	L
		COLPAT (m) Colour pattern	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) ~~6 : border stripe~~	E
		CONRAD (O) Conspicuous, radar	1 : radar conspicuous ~~2 : not radar conspicuous~~ 3 : radar conspicuous (has radar reflector)	E
		NATCON (O) Nature of construction	~~1 : masonry~~ ~~2 : concreted~~ ~~3 : loose boulders~~ ~~4 : hard surfaced~~ ~~5 : unsurfaced~~ 6 : wooden	L

			7 : metal 8 : glass reinforced plastic (GRP) 9 : painted	
		OBJNAM (O) Object name		S
		STATUS (O) 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~~	L

Comment [j280]: S-57 Extension 06/01.

Buoy shape: IHO Definition:

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.

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.

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.

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.

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.

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.

7) **Super-buoy**

   IHO Definition: A very large buoy, generally more than 5m in diameter.

8) **Ice buoy**

IHO Definition: A specially constructed shuttle shaped buoy which is used in ice conditions.

Remarks:
- The principal shapes are those recommended in the International Association of Lighthouse Authorities - IALA System.

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.

Remarks:
- Cardinal marks do not have a distinctive shape but are normally pillar or spar. 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 TOPMAR features). Cardinal marks may also have a special system of flashing white lights and if such lights are fitted they are encoded as separate LIGHTS features.

Colour pattern: IHO Definition:

1) **Horizontal stripes**

   IHO Definition: Straight bands or stripes of differing colours painted horizontally.

2) **Vertical stripes**

   IHO Definition: Straight bands or stripes of differing colours painted vertically.

3) **Diagonal stripes**

   IHO Definition: Straight bands or stripes of differing colours painted diagonally (i.e. not horizontally or vertically).

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.

5) **Stripes (direction unknown)**

   IHO Definition: Straight bands or stripes of differing colours painted in an unknown direction.

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.

INT 1 Reference: Q 130.3

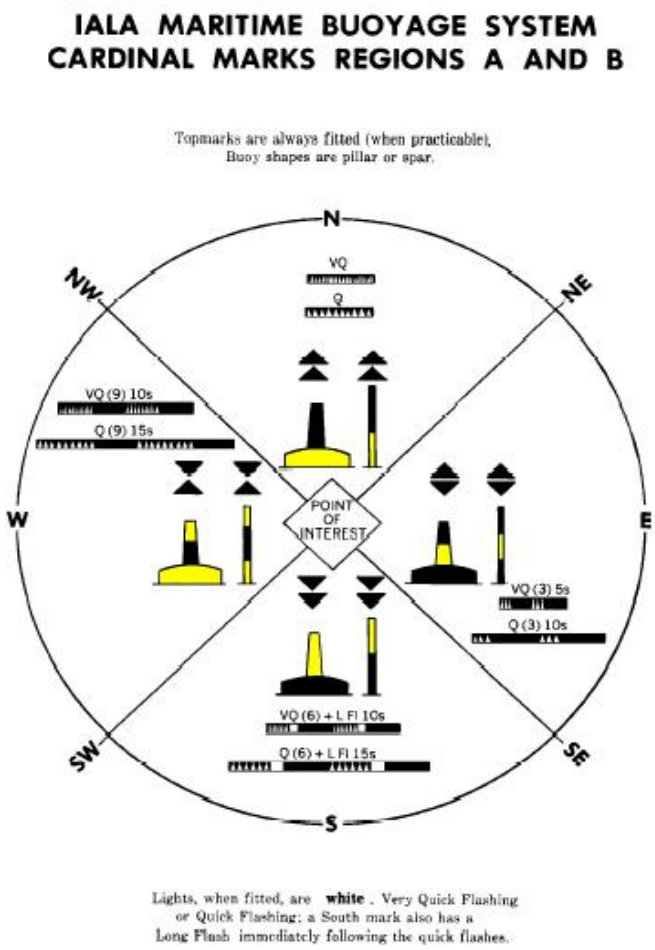
19.8.1 Cardinal buoys

Geo feature: Buoy, cardinal (**BOYCAR**)

Attributes:

BOYSHP	COLOUR	COLPAT	CATCAM	CONRAD	DATEND
DATSTA					
MARSYS -	only if different to the value encoded on meta feature **M_NSYS**				
NATCON	NOBJNM	OBJNAM	PEREND	PERSTA	STATUS
VERLEN	INFORM	NINFOM	NTXTDS	PICREP	SCAMIN
TXTDSC	RECDAT	RECIND	SORDAT	SORIND	

Remarks:
- If it is required to encode the total vertical length, including any equipment features (e.g. topmark, light), of the buoy above the water level, it must be done using the attribute VERLEN.
- If it is required to encode a buoy that has more than one colour, the attributes COLOUR and COLPAT must be encoded, according to the rules laid out in clause X.X.



Distinction: Buoy, lateral; buoy, safe water; buoy, isolated danger; buoy, special purpose/general; buoy, installation; mooring/warping facility.

19.9 Topmarks

IHO Definition: **TOPMARK**. A characteristic shape secured at the top of a buoy or beacon to aid in its identification. (IHO Dictionary – S-32, Edition 5; 5548).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**TOPMAR** (P)	COLOUR (O) 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	L
		COLPAT (m) Colour pattern	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) ~~6 : border stripe~~	E
		STATUS (O) 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~~	L
		TOPSHP (M) Topmark/day mark shape	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	E

Comment [j281]: S-57 Extension 06/01.

			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)	

Topmak/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).

1) **Cone, point up**

IHO Definition: Is where the vertex points up.

2) **Cone, point down**

IHO Definition: Is where the vertex points down.

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).

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).

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).

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.

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.

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 "+".

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.

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.

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, Edition 5; 3734). 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, Edition 5; 3734). 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.

18) **Sphere over rhombus**

IHO Definition: A sphere located above a rhombus.

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.

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.

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.

28) **T-shape**

IHO Definition: Having a shape like the capital letter T.

29) **Triangle pointing up over a circle**

IHO Definition: A triangle, vertex uppermost, located above a circle.

30) **Upright cross over a circle**

IHO Definition: An upright cross located above a circle.

31) **Rhombus over circle**

IHO Definition: A rhombus located above a circle.

32) **Circle over a triangle pointing up**

IHO Definition: A circle located over a triangle, vertex uppermost.

INT 1 Reference: Q 9

19.9.1 Topmarks (see S-4 – B-463)

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

Geo feature:	Topmark (**TOPMAR**)					
Attributes:	COLOUR	COLPAT	DATEND	DATSTA	PERSTA	PEREND
	STATUS	TOPSHP	INFORM	NINFOM	NTXTDS	PICREP
	SCAMIN	TXTDSC	RECDAT	RECIND	SORDAT	SORIND

Comment [j282]: S-57 Supplement No. 2.

Remarks:

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; daymark.

19.10 Retro-reflectors

IHO Definition: **RETRO-REFLECTOR**. A means of distinguishing unlighted marks at night. Retro-reflective material is secured to the mark in a particular pattern to reflect back light. (UKHO NP 735, 5th Edition).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**RETRFL** (P)	COLOUR (O) 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	L
		COLPAT (m) Colour pattern	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) ~~6 : border stripe~~	E
		STATUS (O) 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~~	L

Comment [j283]: S-57 Extension 06/01.

INT 1 Reference:

19.10.1 Retro-reflectors

If it is required to encode a retro-reflector, it must be done using the feature **RETRFL**.

Geo feature: Retro-reflector (**RETRFL**)
Attributes: COLOUR COLPAT DATEND DATSTA HEIGHT PEREND PERSTA STATUS
INFORM - NINFOM describes letters, patterns or numerals shown on the retro-reflector
NTXTDS SCAMIN TXTDSC RECDAT RECIND

Comment [j284]: S-57 Supplement No. 2.

SORDAT SORIND

Remarks:

- The body carrying the retro-reflector is a separate feature.

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; radar reflector.

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, Edition 5; 420).

A cardinal beacon is used in conjunction with the compass to indicate where the mariner may find the best navigable water. It is placed in one of the four quadrants (North, East, South and West), bounded by inter-cardinal bearings from the point marked. (UKHO NP 735, 5th Edition).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**BCNCAR** (P)	BCNSHP (M) Beacon shape	1 : stake, pole, perch, post 2 : withy 3 : beacon tower 4 : lattice beacon 5 : pile beacon 6 : cairn 7 : buoyant beacon	E
		CATCAM (M) Category of cardinal mark	1 : north cardinal mark 2 : east cardinal mark 3 : south cardinal mark 4 : west cardinal mark	E
		COLOUR (M) 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	L
		COLPAT (m) Colour pattern	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) ~~6 : border stripe~~	E
		CONDTN (O) Condition	1 : under construction 2 : ruined ~~3 : under reclamation~~ ~~4 : wingless~~ ~~5 : planned construction~~	E
		CONRAD (O) Conspicuous, radar	1 : radar conspicuous ~~2 : not radar conspicuous~~ 3 : radar conspicuous (has radar reflector)	E

		CONVIS (O) Conspicuous, visually	1: visually conspicuous ~~2: not visually conspicuous~~	E
		NATCON (O) Nature of construction	~~1 : masonry~~ 2 : concreted 3 : loose boulders ~~4 : hard surfaced~~ ~~5 : unsurfaced~~ 6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted	L
		OBJNAM (O) Object name		S
		STATUS (O) 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~~	L

Comment [j285]: S-57 Extension 06/01.

Beacon Shape: IHO Definition:

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, Edition 5; 4960).

2) **Withy**

   IHO Definition: A tree without roots stuck or spoiled into the bottom of the sea to serve as a navigational aid.

3) **Beacon tower**

   IHO Definition: A solid structure of the order of 10 metres in height used as a navigational aid.

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.

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, Edition 5; 3840 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, Edition 5; 601).

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. (IHO Specifications, M-4, 459.1).

Remarks:
- The beacon shape describes the characteristic geometric form of the beacon.

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.

Remarks:
- Cardinal marks do not have a distinctive shape but are normally pillar or spar. 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 TOPMAR features). Cardinal marks may also have a special system of flashing white lights and if such lights are fitted they are encoded as separate LIGHTS features.

Colour pattern: IHO Definition:

1) **Horizontal stripes**

IHO Definition: Straight bands or stripes of differing colours painted horizontally.

2) **Vertical stripes**

IHO Definition: Straight bands or stripes of differing colours painted vertically.

3) **Diagonal stripes**

IHO Definition: Straight bands or stripes of differing colours painted diagonally (i.e. not horizontally or vertically).

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.

5) **Stripes (direction unknown)**

IHO Definition: Straight bands or stripes of differing colours painted in an unknown direction.

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.

INT 1 Reference: Q 130.3

19.11.1 Cardinal beacons

Geo feature: Beacon cardinal (**BCNCAR**)

Attributes:						
	BCNSHP	CATCAM	COLOUR	COLPAT	CONDTN	CONRAD
	CONVIS	DATEND	DATSTA	ELEVAT	HEIGHT	MARSYS
	NATCON	NOBJNM	OBJNAM	PEREND	PERSTA	STATUS
	VERLEN	INFORM	NINFOM	NTXTDS	PICREP	SCAMIN

TXTDSC RECDAT RECIND SORDAT SORIND

Remarks:

- 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 ELEVAT, but only for beacons built on land.
- If it is required to encode the total altitude of a beacon, including any equipment features (e.g. topmark, 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 any equipment features (e.g. topmark, light), above the seabed or ground, it must be done using the attribute VERLEN.
- 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 beacon that has more than one colour, the attributes COLOUR and COLPAT must be encoded, according to the rules laid out in clause X.X.

Distinction: Daymark; beacon, lateral; beacon, safe water; beacon, isolated danger; beacon, special purpose/general.

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; 420).

A safe water beacon is used to indicate that there is navigable water around the mark. (UKHO NP735, 5th Edition).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**BCNSAW** (P)	BCNSHP (M) Beacon shape	1 : stake, pole, perch, post 2 : withy 3 : beacon tower 4 : lattice beacon 5 : pile beacon 6 : cairn 7 : buoyant beacon	E
		COLOUR (M) 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	L
		COLPAT (m) Colour pattern	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) ~~6 : border stripe~~	E
		CONDTN (O) Condition	1 : under construction 2 : ruined ~~3 : under reclamation~~ ~~4 : wingless~~ ~~5 : planned construction~~	E
		CONRAD (O) Conspicuous, radar	1 : radar conspicuous ~~2 : not radar conspicuous~~ 3 : radar conspicuous (has radar reflector)	E
		CONVIS (O) Conspicuous, visually	1: visually conspicuous ~~2: not visually conspicuous~~	E
		NATCON (O)	~~1 : masonry~~	L

		Nature of construction	2 : concreted 3 : loose boulders ~~4 : hard surfaced~~ ~~5 : unsurfaced~~ 6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted	
		OBJNAM (O) Object name		S
		STATUS (O) 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~~	L

Comment [j286]: S-57 Extension 06/01.

Beacon Shape: IHO Definition:

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, Edition 5; 4960).

2) **Withy**

   IHO Definition: A tree without roots stuck or spoiled into the bottom of the sea to serve as a navigational aid.

3) **Beacon tower**

   IHO Definition: A solid structure of the order of 10 metres in height used as a navigational aid.

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.

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, Edition 5; 3840 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, Edition 5; 601).

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. (IHO Specifications, M-4, 459.1).

Remarks:
- The beacon shape describes the characteristic geometric form of the beacon.

Colour pattern: IHO Definition:

1) **Horizontal stripes**

IHO Definition: Straight bands or stripes of differing colours painted horizontally.

2) **Vertical stripes**

IHO Definition: Straight bands or stripes of differing colours painted vertically.

3) **Diagonal stripes**

IHO Definition: Straight bands or stripes of differing colours painted diagonally (i.e. not horizontally or vertically).

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.

5) **Stripes (direction unknown)**

IHO Definition: Straight bands or stripes of differing colours painted in an unknown direction.

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.

INT 1 Reference: Q 130.5

19.12.1 Safe water beacons

Geo feature: Beacon cardinal, (**BCNCAR**)

Attributes:

BCNSHP	COLOUR	COLPAT	CONDTN	CONRAD	CONVIS
DATEND	DATSTA	ELEVAT	HEIGHT	MARSYS	NATCON
NOBJNM	OBJNAM	PEREND	PERSTA	STATUS	VERLEN
INFORM	NINFOM	NTXTDS	PICREP	SCAMIN	TXTDSC
RECDAT	RECIND	SORDAT	SORIND		

Remarks:
- 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 ELEVAT, but only for beacons built on land.
- If it is required to encode the total altitude of a beacon, including any equipment features (e.g. topmark, 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 any equipment features (e.g. topmark, light), above the seabed or ground, it must be done using the attribute VERLEN.
- 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 beacon that has more than one colour, the attributes COLOUR and COLPAT must be encoded, according to the rules laid out in clause X.X.

Distinction: Daymark; beacon, cardinal; beacon, lateral; beacon, isolated danger; beacon, special purpose/general.

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, Edition 5; 420).

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).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol*	**BCNISD** (P)	BCNSHP (M) Beacon shape	1 : stake, pole, perch, post 2 : withy 3 : beacon tower 4 : lattice beacon 5 : pile beacon 6 : cairn 7 : buoyant beacon	E
ECDIS Symbol		COLOUR (M) 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	L
		COLPAT (m) Colour pattern	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) ~~6 : border stripe~~	E
		CONDTN (O) Condition	1 : under construction 2 : ruined ~~3 : under reclamation~~ ~~4 : wingless~~ ~~5 : planned construction~~	E
		CONRAD (O) Conspicuous, radar	1 : radar conspicuous ~~2 : not radar conspicuous~~ 3 : radar conspicuous (has radar reflector)	E
		CONVIS (O) Conspicuous, visually	1: visually conspicuous ~~2: not visually conspicuous~~	E
		NATCON (O)	~~1 : masonry~~	L

		Nature of construction	2 : concreted 3 : loose boulders ~~4 : hard surfaced~~ ~~5 : unsurfaced~~ 6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted	
		OBJNAM (O) Object name		S
		STATUS (O) 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~~	L

Comment [j287]: S-57 Extension 06/01.

Beacon Shape: IHO Definition:

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, Edition 5; 4960).

2) **Withy**

   IHO Definition: A tree without roots stuck or spoiled into the bottom of the sea to serve as a navigational aid.

3) **Beacon tower**

   IHO Definition: A solid structure of the order of 10 metres in height used as a navigational aid.

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.

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, Edition 5; 3840 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, Edition 5; 601).

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. (IHO Specifications, M-4, 459.1).

Remarks:
- The beacon shape describes the characteristic geometric form of the beacon.

Colour pattern: IHO Definition:

1) **Horizontal stripes**

IHO Definition: Straight bands or stripes of differing colours painted horizontally.

2) **Vertical stripes**

IHO Definition: Straight bands or stripes of differing colours painted vertically.

3) **Diagonal stripes**

IHO Definition: Straight bands or stripes of differing colours painted diagonally (i.e. not horizontally or vertically).

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.

5) **Stripes (direction unknown)**

IHO Definition: Straight bands or stripes of differing colours painted in an unknown direction.

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.

INT 1 Reference: IQ 130.4

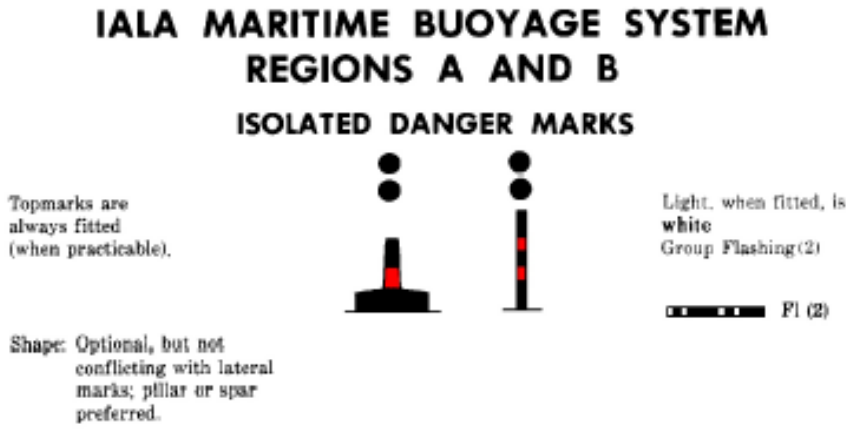
19.13.1 Isolated danger beacons

Geo feature: Beacon lateral, (**BCNISD**)

Attributes:

BCNSHP	COLOUR	COLPAT	CONDTN	CONRAD	CONVIS
DATEND	DATSTA	ELEVAT	HEIGHT	MARSYS	NATCON
NOBJNM	OBJNAM	PEREND	PERSTA	STATUS	VERLEN
INFORM	NINFOM	NTXTDS	PICREP	SCAMIN	TXTDSC
RECDAT	RECIND	SORDAT	SORIND		

Remarks:
- 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 ELEVAT, but only for beacons built on land.
- If it is required to encode the total altitude of a beacon, including any equipment features (e.g. topmark, 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 any equipment features (e.g. topmark, light), above the seabed or ground, it must be done using the attribute VERLEN.
- 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 beacon that has more than one colour, the attributes COLOUR and COLPAT must be encoded, according to the rules laid out in clause X.X.



Distinction: Daymark; beacon, lateral; beacon, safe water; beacon, cardinal; beacon, special purpose/general.

19.14 Installation buoys

IHO Definition: **BUOY INSTALLATION**. 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, Edition 5; 565).

An installation buoy is a buoy used for loading tankers with gas or oil. (IHO Chart Specifications, M-4).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**BOYINB** (P)	BOYSHP (M) Buoy shape	1 : conical (nun, ogival) 2 : can (cylindrical) 3 : spherical 4 : pillar 5 : spar (spindle) 6 : barrel (tun) 7 : super-buoy 8 : ice buoy	E
		CATINB (O) Category of installation buoy	1 : catenary anchor leg mooring (CALM) 2 : single buoy mooring (SBM or SPM)	E
		COLOUR (M) 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	L
		COLPAT (m) Colour pattern	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) ~~6 : border stripe~~	E
		CONRAD (O) Conspicuous, radar	1 : radar conspicuous ~~2 : not radar conspicuous~~ 3 : radar conspicuous (has radar reflector)	E
		NATCON (O) Nature of construction	~~1 : masonry~~ ~~2 : concreted~~ ~~3 : loose boulders~~ ~~4 : hard surfaced~~ ~~5 : unsurfaced~~ 6 : wooden	L

			7 : metal 8 : glass reinforced plastic (GRP) 9 : painted	
		OBJNAM (O) Object name		S
		PRODCT (O) 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~~ ~~16 : sawdust/wood chips~~ ~~17 : scrap metal~~ ~~18 : liquefied natural gas (LNG)~~ ~~19 : liquefied petroleum gas (LPG)~~ ~~20 : wine~~ ~~21 : cement~~ ~~22 : grain~~	E
		STATUS (O) 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~~	L

Comment [j288]: S-57 Extension 06/01.

Buoy shape: IHO Definition:

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.

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.

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.

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.

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.

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.

7) **Super-buoy**

IHO Definition: A very large buoy, generally more than 5m in diameter.

8) **Ice buoy**

IHO Definition: A specially constructed shuttle shaped buoy which is used in ice conditions.

Remarks:

- The principal shapes are those recommended in the International Association of Lighthouse Authorities - IALA System.

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, Edition 5; XXXX).

INT 1 Reference: L 16

19.14.1 Installation buoys

Geo feature: Buoy installation, (**BOYINB**)

Attributes:	BOYSHP	CATINB	COLOUR	COLPAT	CONRAD	DATEND
	DATSTA					
	MARSYS -	only if different to the value encoded on meta feature **M_NSYS**				
	NATCON	NOBJNM	OBJNAM	PEREND	PERSTA	
	PRODCT -	only for **BOYINB**				
	STATUS	VERLEN	INFORM	NINFOM	NTXTDS	PICREP
	SCAMIN	TXTDSC	RECDAT	RECIND	SORDAT	SORIND

Remarks:

- If it is required to encode the total vertical length, including any equipment features (e.g. topmark, light), of the buoy above the water level, it must be done using the attribute VERLEN.
- If it is required to encode a buoy that has more than one colour, the attributes COLOUR and COLPAT must

be encoded, according to the rules laid out in clause X.X.

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, Edition 5; 2821).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**LITFLT** (P)	COLOUR (M) 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	L
		COLPAT (m) Colour pattern	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) ~~6 : border stripe~~	E
		CONRAD (O) Conspicuous, radar	1 : radar conspicuous ~~2 : not radar conspicuous~~ 3 : radar conspicuous (has radar reflector)	E
		CONVIS (O) Conspicuous, visually	1: visually conspicuous ~~2: not visually conspicuous~~	E
		NATCON (O) Nature of construction	~~1 : masonry~~ 2 : concreted 3 : loose boulders ~~4 : hard surfaced~~ ~~5 : unsurfaced~~ 6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted	L
		STATUS (O) Status	~~1 : permanent~~ ~~2 : occasional~~ ~~3 : recommended~~ ~~4 : not in use~~ 5 : periodic/intermittent ~~6 : reserved~~ ~~7 : temporary~~ ~~8 : private~~	L

			~~9 : mandatory~~ ~~11 : extinguished~~ ~~12 : illuminated~~ ~~13 : historic~~ ~~14 : public~~ ~~15 : synchronized~~ ~~16 : watched~~ ~~17 : un-watched~~ ~~18 : existence doubtful~~ ~~19 : buoyed~~	

Comment [j289]: S-57 Extension 06/01.

INT 1 Reference: Q 30-31

19.15.1 Lights floats (see S-4 – B-462.8)

If it is required to encode a light float, it must be done using the feature **LITFLT**.

Geo feature: Light float (**LITFLT**)

Attributes:

COLOUR	COLPAT	CONRAD	CONVIS	DATEND	DATSTA
HORLEN	HORWID	NATCON	NOBJNM	OBJNAM	PEREND
PERSTA	STATUS	VERLEN	INFORM	NINFOM	NTXTDS
PICREP	SCAMIN	TXTDSC	RECDAT	RECIND	SORDAT
SORIND					

Remarks:

Distinction: Buoy, cardinal; buoy, installation; buoy, isolated danger; buoy, lateral; buoy, safe water; buoy, special purpose/general; light vessel.

19.16 Light vessels

IHO Definition: **LIGHT VESSEL**. 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, Edition 5; 2828, 2829).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**LITVES** (P)	COLOUR (M) 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	L
		COLPAT (m) Colour pattern	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) ~~6 : border stripe~~	E
		CONRAD (O) Conspicuous, radar	1 : radar conspicuous ~~2 : not radar conspicuous~~ 3 : radar conspicuous (has radar reflector)	E
		CONVIS (O) Conspicuous, visually	1: visually conspicuous ~~2: not visually conspicuous~~	E
		NATCON (O) Nature of construction	~~1 : masonry~~ 2 : concreted 3 : loose boulders ~~4 : hard surfaced~~ ~~5 : unsurfaced~~ 6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted	L
		STATUS (O) Status	~~1 : permanent~~ ~~2 : occasional~~ ~~3 : recommended~~ ~~4 : not in use~~ 5 : periodic/intermittent ~~6 : reserved~~ ~~7 : temporary~~	L

			~~8 : private~~ ~~9 : mandatory~~ ~~11 : extinguished~~ ~~12 : illuminated~~ ~~13 : historic~~ ~~14 : public~~ ~~15 : synchronized~~ ~~16 : watched~~ ~~17 : un-watched~~ ~~18 : existence doubtful~~ ~~19 : buoyed~~	

Comment [j290]: S-57 Extension 06/01.

INT 1 Reference: P 6

19.16.1 Lights vessels (see S-4 – B-474.1)

If it is required to encode a light vessel, it must be done using the feature **LITVES**.

Geo feature: Light vessel (**LITVES**)

Attributes:

COLOUR	COLPAT	CONRAD	CONVIS	DATEND	DATSTA
HORLEN	HORWID	NATCON	NOBJNM	OBJNAM	PEREND
PEREND	PERSTA	STATUS	VERLEN	INFORM	NINFOM
NTXTDS	PICREP	SCAMIN	TXTDSC	RECDAT	RECIND
SORDAT	SORIND				

Remarks:

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 float.

19.17 Radar reflectors

IHO Definition: **RADAR REFLECTOR**. A device capable of, or intended for, reflecting radar signals. (IHO Dictionary – S-32, Edition 5; 4147).

A radar reflector is usually a "tetrahedron or pentagonal corner reflector (…) to facilitate reflection towards the sender". (International Maritime Dictionary, 2nd Ed.).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**RADRFL** (P)	STATUS (O) 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~~	L

Comment [j291]: S-57 Extension 06/01.

INT 1 Reference: S 4

19.17.1 Radar reflectors (see S-4 – B-485.2)

If it is required to encode radar reflectors on line features (e.g. overhead cables), this must be done using the feature **RADRFL**.

Geo feature: Radar reflector (**RADRFL**)

Attributes:

HEIGHT	DATSTA	DATEND	PEREND	PERSTA	STATUS
INFORM	NINFOM	NTXTDS	SCAMIN	TXTDSC	RECDAT
RECIND	SORDAT	SORIND			

Comment [j292]: S-57 Supplement No. 2.

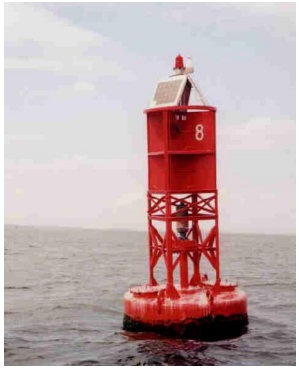
Remarks:

- If it is required to encode an feature which has no radar reflector, but is radar conspicuous, it must be indicated using attribute CONRAD = *1* (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 CONRAD = *3* (radar conspicuous (has radar reflector)) on the feature.

Distinction: Retro-reflector.

19.18 Fog signals

IHO Definition: **FOG SIGNALS**. 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, Edition 5; 1890).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World  Lighted Horn Buoy *Photograph, courtesy of the Pacific Hydrographic Branch*  Lighted Bell Buoy *Photograph, courtesy of the Pacific Hydrographic Branch* *Paper Chart Symbol* *ECDIS Symbol*	**FOGSIG** (P)	CATFOG (M) Category of fog signal	1 : explosive 2 : diaphone 3 : siren 4 : nautophone 5 : reed 6 : tyfon 7 : bell 8 : whistle 9 : gong 10 : horn	E
		SIGFRQ (O) Signal frequency	Unit: Hertz (Hz) Resolution: 1 Hz Format: xxxxxxxxxxxx Example: **950000000** for a radio signal centred on 950 MHz	I
		SIGGEN (O) Signal generation	1 : automatically 2 : by wave action 3 : by hand 4 : by wind (see encoding instruction 6)	E
		SIGGRP (m) Signal group	See below for description and example of formatted string value	A
		SIGPER (m) Signal period	Unit: Seconds (s) – minimum value > 0 Resolution: 0·01s Format: xx.xx Example: **12** for an interval of 12 seconds	F
		SIGSEQ (O) Signal sequence	See below for description and example of formatted string value	A
		STATUS (O) Status	1 : permanent 2 : occasional ~~3 : recommended~~ 4 : not in use 5 : periodic/intermittent ~~6 : reserved~~ 7 : temporary 8 : private ~~9 : mandatory~~	L

Comment [j293]: MD8 – 2.Cl.7 and 2.Co.6.

Comment [j294]: MD8 – 7.Co.19.

			~~11 : extinguished~~ ~~12 : illuminated~~ ~~13 : historic~~ ~~14 : public~~ 15 : synchronized 16 : watched 17 : un-watched ~~18 : existence doubtful~~ ~~19 : buoyed~~	
		VALMXR (O) Value of maximum range	Unit: Nautical mile (M) Resolution: 0·1M Format: xx.x Example: **17** for a maximum range of 17 nautical miles	F

Comment [j295]: S-57 Extension 06/01.

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, Edition 5; 3371).

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, Edition 5; 5717).

7) **Bell**

   IHO Definition: A ringing sound with a short range. The apparatus may be operated automatically, by hand or by wave action. (IHO Chart Specifications,S-4, 452.5).

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. (IHO Chart Specifications, S-4, 452.6).

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. (IHO Chart Specifications,S-4, 452.7)

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”.

Signal frequency: IHO Definition: The frequency of a signal.

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.

2) **By wave action**

   IHO Definition: The signal is generated by the motion of the sea surface such as a bell in a buoy.

3) **By hand**

   IHO Definition: The signal is generated by a manually operated mechanism such as a hand cranked siren.

4) **By wind**

   IHO Definition: The signal is generated by the motion of air such as a wind driven whistle.

Remarks:

- The attribute “signal generation” encodes the mechanism used to generate a fog signal.

Signal group: IHO Definition: The number of signals, the combination of signals or the morse character(s) within one period of full sequence.

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		SIGGRP Indication
VQ(6)+LFl	->	(6)(1)
Fl+LFl(2+3)	->	(1)(2+3)
Fl(2)+Lfl(3)	->	(2)(3)
FFl	->	()(1)
Mo(AA)	->	(AA)
AlFl(2W+1R)	->	(2+1)
AlLFlWR	->	(2)
FOcW	->	()(1)
AlOc(4)WR	->	(4)

Signal period: IHO Definition: The time occupied by an entire cycle of intervals of light and eclipse.

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.

Indication: Unit for value of intervals: 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 and two intervals of eclipse. 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 and t intervals of light. 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 [j296]: MD8 – 5.Co.5.

Comment [j297]: MD8 – 5.Co.5.

Comment [j298]: MD8 – 5.Co.5.

Comment [j299]: MD8 – 5.Co.5.

Comment [j300]: MD8 – 2.Cl.8

Value of maximum range: IHO Definition: The extreme distance at which an object can be seen or a signal detected.

Remarks:

- This attribute does not apply to lights where the attribute "value of nominal range" should be used.

INT 1 Reference: R 1, 10-16, 20-22

19.18.1 Fog signals (see S-4 – B-451)

If it is required to encode a fog signal, it must be done using the feature **FOGSIG**.

Geo feature: Fog signal (**FOGSIG**)

Attributes:

CATFOG	DATEND	DATSTA	NOBJNM	OBJNAM	PERSTA
PEREND	SIGFRQ	SIGGEN	SIGGRP	SIGPER	SIGSEQ
STATUS	VALMXR	INFORM	NINFOM	NTXTDS	SCAMIN
TXTDSC	RECDAT	RECIND	SORDAT	SORIND	

Remarks:

Distinction: Signal station, warning.

Comment [j301]: S-57 Supplement No. 2.

20 Radar, Radio

20.1 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, Edition 5; 4191).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World	**RDOSTA** (P)	CALSGN (O) Call sign		S
Paper Chart Symbol *ECDIS Symbol*		CATROS (O) Category of radio station	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 GPS 11 : Toran 12 : Omega 13 : Syledis 14 : Chaika (Chayka) 15 : Radio telephone station	L
		COMCHA (O) Communication channel	See below for description and example of formatted string value	A
		ESTRNG (O) Estmated range of transmission	Unit: Nautical mile (M) Resolution: 0·1M Format: xxx.x Example: **45** for a maximum range of 45 nautical miles	F
		ORIENT (O) Orientation	Unit: Degree (°) – minimum value 0; maximum value 360 Resolution: 0·01° Format: xxx.xX Example: **246.7** for an orientation of 246·7 degrees	F
		SIGFRQ (O)	Unit: Hertz (Hz)	I

Comment [j302]: S-57 Extension 06/01.

		Signal frequency	Resolution: 1 Hz Format: xxxxxxxxxxxx Example: **950000000** for a radio signal centred on 950 MHz	
		STATUS (O) 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~~	L

Comment [j303]: MD8 – 2.Cl.7 and 2.Co.6.

Comment [j304]: S-57 Extension 06/01.

Call sign: IHO Definition: The designated call-sign of a radio station, pilot, ...

Comment [j305]: MD8 – 5.Co.1.

Category of radio station: IHO Definition:

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, Edition 5; 802).

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, Edition 5; 1378).

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, Edition 5; 4444).

4) **Consol beacon**

   IHO Definition: A type of long range position fixing beacon.

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, Edition 5; 4174).

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, Edition 5; 4108).

7) **Aeronautical radiobeacon**

IHO Definition: A radio beacon designed for aeronautical use.

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: Loran-C is 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 GPS**

IHO Definition: A radiobeacon transmitting DGPS correction signals.

11) **Toran**

IHO Definition: Toran is an electronic position fixing system used mainly by aircraft.

12) **Omega**

IHO Definition: Omega is 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: Syledis is a ranging position fixing system operating at 420-450MHz over a range of up to 400Km.

14) **Chaika (Chayka)**

IHO Definition: Chiaka is 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 [j306]: S-57 Extension 06/01.

Remarks:

- A radiobeacon is a radio transmitter which emits a distinctive or characteristic signal on which a bearing may be taken (IHO Dictionary – S-32, Edition 5; 4168).

Communication channel: IHO Definition: A channel number assigned to a specific radio frequency, frequencies or frequency band

Expected input: Enter specific VHF-Channel.

Indication: Each VHF-Channel should be indicated by 2 digits and up to 2 characters (A-Z).

Format: [XXXX];[XXXX];….

Example: **07** for VHF-Channel 7

Remarks:

- The attribute “communication channel” encodes the various VHF-Channels used for communication. The indication of several VHF-Channels is possible.

Estimated range of transmission: IHO Definition: The estimated range of a non-optical electromagnetic transmission.

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 he is likely to receive transmission at a certain distance

from an object carrying this attribute.

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).

Signal frequency: IHO Definition: The frequency of a signal.

INT 1 Reference: S 10-16

20.1.1 Radio stations (see S-4 – B-480 to B-485)

The feature "radio station" is used to encode the point of transmission of the signal. The transmission of a radio station may serve to provide mariners with a line of position.

If it is required to encode a radio station, it must be done using the feature **RDOSTA**.

Geo feature:	Radio station (**RDOSTA**)					
Attributes:	CALSGN	CATROS	COMCHA	DATEND	DATSTA	ESTRNG
	NOBJNM	OBJNAM	ORIENT	PEREND	PERSTA	SIGFRQ
	STATUS	INFORM	NINFOM	NTXTDS	SCAMIN	TXTDSC
	RECDAT	RECIND	SORDAT	SORIND		

Remarks:

- The **RDOSTA** 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. **BUISGL**, **LNDMRK**).
- Further information (e.g. transmission characteristic) may be encoded using attribute INFORM or TXTDSC.

Distinction: Radio calling in point; radar station.

20.2 Radar transponder beacon

IHO Definition: **RADAR TRANSPONDER BEACON**. A transponder beacon transmitting a coded signal on radar frequency, permitting an interrogating craft to determine the bearing and range of the transponder. Also called racon. (IHO Dictionary – S-32, Edition 5; 4137).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**RTPBCN** (P)	CATRTB (M)	1 : ramark, radar beacon transmitting continuously 2 : racon, radar transponder beacon 3 : leading racon/radar transponder beacon	E
		RADWAL (O) Radar wave length	See below for description and example of formatted string value	A
		SECTR1 (m) Sector limit one	Unit: Degree (°) Resolution: 0·01° Format: xxx.xx Example: **125** for a sector orientation of 125 degrees	F
		SECTR2 (m) Sector limit two	Unit: Degree (°) Resolution: 0·01° Format: xxx.xx Example: **220** for a sector orientation of 220 degrees	F
		SIGGRP (m) Signal group	See below for description and example of formatted string value	A
		STATUS (O) 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~~	L

Comment [j307]: S-57 Extension 06/01.

		VALMXR (O) Value of maximum range	Unit: Nautical mile (M) Resolution: 0·1M Format: xx.x Example: **17** for a maximum range of 17 nautical miles	F

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. Ramarks are intended primarily for marine use. The name "ramark" is derived from the words radar marker. (IHO Dictionary – S-32, Edition 5; 4208).

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, Edition 5; 4132).

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.

Value of 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.

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 aradar 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.

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 2 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).

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.

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 1 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).

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.

Signal group: IHO Definition: The number of signals, the combination of signals or the morse character(s) within one period of full sequence.

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		SIGGRP Indication
VQ(6)+LFl	->	(6)(1)
Fl+LFl(2+3)	->	(1)(2+3)
Fl(2)+Lfl(3)	->	(2)(3)
FFl	->	()(1)
Mo(AA)	->	(AA)
AlFl(2W+1R)	->	(2+1)
AlLFlWR	->	(2)
FOcW	->	()(1)
AlOc(4)WR	->	(4)

Value of maximum range: IHO Definition: The extreme distance at which an object can be seen or a signal detected.

Remarks:
- This attribute does not apply to lights where the attribute “value of nominal range” should be used.

INT 1 Reference: S 2-3

20.2.1 Radar beacons (see S-4 – B-486)

If it is required to encode a radar beacon, it must be done using the feature **RTPBCN**.

Geo feature: Radar transponder beacon (**RTPBCN**)
Attributes: CATRTB DATEND DATSTA NOBJNM OBJNAM PEREND
PERSTA RADWAL SECTR1 SECTR2
SIGGRP - morse identification letter(s)
SIGSEQ STATUS VALMXR INFORM NINFOM NTXTDS

Comment [j308]: S-57 Extension 06/01 and Supplement No. 2.

SCAMIN TXTDSC RECDAT RECIND SORDAT SORIND

Remarks:

- The **RTPBCN** 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. **BUISGL**, **LNDMRK**).
- 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).
- The sweep period may be encoded using the attribute INFORM.

Distinction: Radar line; radar range; radar station.

21 Services

21.1 Pilot boarding place

IHO Definition: **PILOT BOARDING PLACE.** The meeting place to which the pilot comes out. (IHO Chart Specifications, M-4).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World	**PILBOP** (P, A)	CALSGN (O) Call sign		S
Paper Chart Symbol		CATPIL (O) Category of pilot boarding place	1 : boarding by pilot-cruising vessel 2 : boarding by helicopter 3 : pilot comes out from shore	E
ECDIS Symbol		COMCHA (O) Communication channel	See below for description and example of formatted string value	A
		OBJNAM (O) Object name		S
		PILDST (O) Pilot district		S
		STATUS (O) 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~~	L

Call sign: IHO Definition: The designated call-sign of a radio station pilot, ...

Category of pilot boarding place: IHO Definition:

1) **Boarding by pilot-cruising vessel**

IHO Definition: Pilot boards from a cruising vessel.

Comment [j309]: S-57 Extension 06/01.

Comment [j310]: S-57 Extension 06/01.

Comment [j311]: MD8 – 5.Co.1.

Comment [j312]: S-57 Extension 06/01.

2) **Boarding by helicopter**

IHO Definition: Pilot boards by helicopter which comes out from the shore.

3) **Pilot comes out from shore**

IHO Definition: Pilot boards from a vessel which comes out from the shore on request.

Communication channel: IHO Definition: A channel number assigned to a specific radio frequency, frequencies or frequency band

Expected input: Enter specific VHF-Channel.

Indication: Each VHF-Channel should be indicated by 2 digits and up to 2 characters (A-Z).

Format: [XXXX];[XXXX];….

Example: **07** for VHF-Channel 7

Remarks:
- The attribute "communication channel" encodes the various VHF-Channels used for communication.
- The indication of several VHF-Channels is possible.

Object name: IHO Definition: The individual name of an object.

Pilot district: IHO Definition: The area in which a particular pilotage service operates.

INT 1 Reference: T 1.1-4

21.1.1 Pilot boarding places (see S-4 – B-491.2)

If it is required to encode a pilot boarding place, it must be done using the feature **PILBOP**.

Geo feature: Pilot boarding place (**PILBOP**)

Attributes:	CATPIL	COMCHA	DATEND	DATSTA	NOBJNM	NPLDST
	OBJNAM	PEREND	PERSTA	PILDST	STATUS	INFORM
	NINFOM	NTXTDS	SCAMIN	TXTDSC	RECDAT	RECIND
	SORDAT	SORIND				

Remarks:

Distinction:

21.2 Coastguard station

IHO Definition: **COASTGUARD STATION.** Watch keeping stations at which a watch is kept either continuously, or at certain times only. (IHO Chart Specifications, M-4).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**CGUSTA** (P)	STATUS (O) 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~~	L

Comment [j313]: S-57 Extension 06/01.

INT 1 Reference: T 10

21.2.1 Coastguard stations (see S-4 – B-492)

If it is required to encode a coastguard station, it must be done using the feature **CGUSTA**.

Geo feature: Coastguard station (**CGUSTA**)

Attributes:

DATEND	DATSTA	NOBJNM	OBJNAM	PEREND	PERSTA
STATUS	INFORM	NINFOM	NTXTDS	SCAMIN	TXTDSC
RECDAT	RECIND	SORDAT	SORIND		

Remarks:

- The **CGUSTA** 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. **BUISGL**, **LNDMRK**).

Distinction: Building, single; rescue station.

21.3 Warning signal stations

IHO Definition: **SIGNAL STATION, WARNING**. A signal station is a place on shore from which signals are made to ships at sea. (IHO Dictionary – S-32, Edition 5; 4742).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**SISTAW** (P)	CATSIW (M) Category of signal station, warning	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	L
		COMCHA (O) Communication channel	See below for description and example of formatted string value	A
		STATUS (O) 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~~	L

Comment [j314]: S-57 Extension 06/01.

Category of signal station, warning: IHO Definition:

1) **Danger**

   IHO Definition: A signal or message warning of the presence of a danger to navigation.

2) **Maritime obstruction**

   IHO Definition: A signal or message warning of the presence of a maritime obstruction.

3) **Cable**

IHO Definition: A signal or message warning of the presence of a cable.

4) **Military practice**

IHO Definition: A signal or message warning of activity in a military practice area.

5) **Distress**

IHO Definition: A station that may receive or transmit distress signals.

6) **Weather**

IHO Definition: A visual signal displayed to indicate a weather forecast. (IHO Dictionary – S-32, Edition 5; 4740).

7) **Storm**

IHO Definition: A signal or message conveying information about storm conditions.

8) **Ice**

IHO Definition: A signal or message conveying information about ice conditions.

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, Edition 5; 4735).

10) **Tide**

IHO Definition: A signal or message conveying information on tidal conditions in the area in question. (IHO Dictionary – S-32, Edition 5; 4734).

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, Edition 5; 4733).

12) **Tide guage**

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, Edition 5; 1984).

13) **Tide scale**

IHO Definition: A visual scale which directly shows the height of the water above chart datum or a local datum. (IHO Chart Specifications, S-4 – B-496).

14) **Diving**

IHO Definition: A signal or message warning of diving activity.

15) **Water level guage**

IHO Definition: A device for measuring and conveying information about the water level (non-tidal) in the area in question.

Communication channel: IHO Definition: A channel number assigned to a specific radio frequency, frequencies or frequency band

Expected input: Enter specific VHF-Channel.

Indication: Each VHF-Channel should be indicated by 2 digits and up to 2 characters (A-Z).

Format: [XXXX];[XXXX];….

Example: **07** for VHF-Channel 7

Remarks:
- The attribute “communication channel” encodes the various VHF-Channels used for communication.
- The indication of several VHF-Channels is possible.

INT 1 Reference: T 20, 26, 28-36

21.3.1 Warning signal stations (see S-4 – B-494 to B-497)

If it is required to encode a warning signal station, it must be done using the feature **SISTAW**.

Geo feature: Signal station, warning (**SISTAW**)

Attributes:	CATSIW	COMCHA	DATEND	DATSTA	NOBJNM	OBJNAM
	PEREND	PERSTA	STATUS	INFORM	NINFOM	NTXTDS
	SCAMIN	TXTDSC	RECDAT	RECIND	SORDAT	SORIND

Remarks:
- The **SISTAW** 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. **BUISGL**, **LNDMRK**).

Distinction: Signal station, traffic.

21.4 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, Edition 5; 4742).

Traffic signal stations regulate the movement of traffic. (IHO Chart Specifications, S-4).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**SISTAT** (P)	CATSIT (M) Category of signal station, traffic	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	L
		COMCHA (O) Communication channel	See below for description and example of formatted string value	A
		STATUS (O) 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~~	L

Comment [j315]: S-57 Extension 06/01.

Category of signal station, traffic: IHO Definition:

1) **Port control**

   IHO Definition: A signal station for the control of vessels within a port.

2) **Port entry and departure**

   IHO Definition: A signal station for the control of vessels entering or leaving a port.

3) **International port traffic**

   IHO Definition: A signal station displaying International Port Traffic signals.

4) **Berthing**

IHO Definition: A signal station for the control of vessels when berthing.

5) **Dock**

IHO Definition: A signal station for the control of vessels entering or leaving a dock.

6) **Lock**

IHO Definition: A signal station for the control of vessels entering or leaving a lock.

7) **Flood barrage**

IHO Definition: A signal station for the control of vessels wishing to pass through a flood control barrage.

8) **Bridge passage**

IHO Definition: A signal station for the control of vessels wishing to pass under a bridge.

9) **Dredging**

IHO Definition: A signal station indicating when dredging is in progress.

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.

Communication channel: IHO Definition: A channel number assigned to a specific radio frequency, frequencies or frequency band

Expected input: Enter specific VHF-Channel.

Indication: Each VHF-Channel should be indicated by 2 digits and up to 2 characters (A-Z).

Format: [XXXX];[XXXX];….

Example: **07** for VHF-Channel 7

Remarks:
- The attribute “communication channel” encodes the various VHF-Channels used for communication.
- The indication of several VHF-Channels is possible.

INT 1 Reference: T 21-25.2

21.4.1 Traffic signal stations (see S-4 – B-494 to B-497)

If it is required to encode a traffic signal station, it must be done using the feature **SISTAT**.

Geo feature: Signal station, traffic (**SISTAT**)

Attributes:	COMCHA	DATEND	DATSTA	NOBJNM	OBJNAM	PEREND
	PERSTA	STATUS	INFORM	NINFOM	NTXTDS	SCAMIN
	TXTDSC	RECDAT	RECIND	SORDAT	SORIND	

Remarks:
- If it is required to encode a bridge light marking the centre of a navigable span, it must be done using the feature **LIGHTS**.
- The **SISTAT** 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. **BUISGL**, **LNDMRK**).

Distinction: Signal station, warning.

21.5 Rescue station

IHO Definition: **RESCUE STATION**. A place at which life saving equipment is held. (IHO Chart Specifications, S-4).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**RSCSTA** (P)	CATRSC (O) Category of rescue station	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	L
		STATUS (O) 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~~	L

Comment [j316]: S-57 Extension 06/01.

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. (IHO Chart Specifications, S-4).

2) **Rescue station with rocket**

   IHO Definition: Rocket - a pyrotechnic projectile used for signalling or for life-saving purposes. (IHO Dictionary – S-32, Edition 5; 4418).

4) **Refuge for shipwrecked mariners**

   IHO Definition: Shelter or protection from danger or distress at sea.

5) **Refuge for intertidal area walkers**

   IHO Definition: Shelter or protection from danger in areas exposed to extreme and sudden tides or tidal streams.

6) **Lifeboat lying at a mooring**

   IHO Definition: A place where a lifeboat is moored ready for use.

7) **Aid radio station**

IHO Definition: A radio station reserved for emergency situations, might also be a public telephone.

8) **First aid equipment**

IHO Definition: A place where first aid equipment is available.

INT 1 Reference: T 12-14

21.5.1 Rescue station (see S-4 – B-493)

If it is required to encode a rescue station, it must be done using the feature **RSCSTA**.

Geo feature:	Rescue station (**RSCSTA**)					
Attributes:	CATRSC	DATEND	DATSTA	NOBJNM	OBJNAM	PEREND
	PERSTA	STATUS	INFORM	NINFOM	NTXTDS	SCAMIN
	TXTDSC	RECDAT	RECIND	SORDAT	SORIND	

Remarks:

- The **RSCSTA** must only be used to describe the function of the rescue station, independent of the building or structure itself. If it is required to encode the building or structure housing the service, it must be done using an appropriate feature (e.g. **BUISGL**, **LNDMRK**).
- If it is required to encode a refuge beacon, it must be done using a **BCNSPP** feature, with attribute CATSPM = *44* (refuge beacon), not by using **RSCSTA**.

Distinction: Beacon special purpose/general; building single; coastguard station.

21.6 Harbour facility

IHO Definition: **HARBOUR FACILITY**. A Harbour installation with a service or commercial operation of public interest. (S-57, Appendix A – Chapter 1, Edition 3.1,Page 1.81, November 2000).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**HRBFAC** (P, A)	CATHAF (M)	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	L
		CONDTN (O) Condition	1 : under construction 2 : ruined ~~3 : under reclamation~~ 4 : wingless 5 : planned construction	E
		NATCON (O) Nature of construction	1 : masonry 2 : concreted ~~3 : loose boulders~~ 4 : hard surfaced ~~5 : unsurfaced~~ 6 : wooden 7 : metal ~~8 : glass reinforced plastic (GRP)~~ 9 : painted	L
		OBJNAM (O) Object name		S
		PRODCT (O) 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 16 : sawdust/wood chips	E

Comment [j317]: S-57 Extension 06/01.

Comment [j318]: S-57 Extension 06/01.

			17 : scrap metal 18 : liquefied natural gas (LNG) 19 : liquefied petroleum gas (LPG) ~~20 : wine~~ 21 : cement 22 : grain	
		RESTRN (m) Restriction	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 artifacts prohibited~~ 23 : cargo transhipment (lightering) prohibited ~~24 : dragging prohibited~~ ~~25 : stopping prohibited~~ ~~26 : landing prohibited~~ 27 : speed restricted ~~28 : swimming prohibited~~	L
		STATUS (O) 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~~	L

Comment [j319]: S-57 Extension 06/01.

Comment [j320]: S-57 Extension 06/01.

			~~18 : existence doubtful~~ ~~19 : buoyed~~	

Comment [j321]: S-57 Extension 06/01.

Category of harbour facility: IHO Definition:

1) **RoRo terminal**

   IHO Definition: A terminal for roll-on roll-off ferries.

3) **Ferry terminal**

   IHO Definition: A terminal for passenger and vehicle ferries.

4) **Fishing harbour**

   IHO Definition: A harbour with facilities for fishing boats.

5) **Yacht harbour/marina**

   IHO Definition: A harbour with facilities for small boats and yachts (IHO Dictionary – S-32, Edition 5; 3095).

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.

8) **Passenger terminal**

   IHO Definition: A terminal for the loading and unloading of passengers.

9) **Shipyard**

   IHO Definition: A place where ships are built or repaired (IHO Dictionary – S-32, Edition 5; 4686).

10) **Container terminal**

    IHO Definition: A terminal for container ships.

11) **Bulk terminal**

    IHO Definition: A terminal for the handling of bulk materials such as iron ore, coal, etc.

12) **Syncrolift**

    IHO Definition: A platform powered by synchronous electric motors used to lift vessels (larger than boats) in and out of the water.

13) **Straddle carrier**

    IHO Definition: A wheeled vehicle designed to lift and carry containers or vessels within its own framework. It is used for moving, and sometimes stacking, shipping containers and vessels.

14) **Service harbour**

    IHO Definition: A harbour within which the floating equipment (dredges, tugs …) of harbour services are stationed.

Comment [j322]: S-57 Extension 06/01.

INT 1 Reference: F 10, 50; U 1.1

21.6.1 Harbour facilities

If it is required to encode a Harbour facility, it must be done using the feature **HRBFAC**.

Geo feature: Harbour facility (**HRBFAC**)

Attributes:

CATHAF	CONDTN	DATEND	DATSTA	NATCON	NOBJNM
OBJNAM	PEREND	PERSTA	PRODCT	RESTRN	STATUS
INFORM	NINFOM	NTXTDS	SCAMIN	TXTDSC	RECDAT

Comment [j323]: S-57 Extension 06/01.

RECIND SORDAT SORIND

Remarks:

- Depending on the navigational purpose, harbour facilities are defined by: an area including docks, basins, and dockside equipment; or a point.

Distinction: Small craft facility.

21.7 Small craft facility

IHO Definition: **SMALL CRAFT FACILITY**. A place at which a service generally of interest to small craft or pleasure boats is available. (S-57, Appendix A – Chapter 1, Edition 3.1,Page 1.162, November 2000).

Graphic	S-101 Geo Feature	S-101 Attribute	Allowable Encoding Value	Attrib. Type
Real World *Paper Chart Symbol* *ECDIS Symbol*	**SMCFAC** (P, A)	CATSCF (M)	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	L
		OBJNAM (O) Object name		S
		STATUS (O) 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	L

			~~13 : historic~~ 14 : public ~~15 : synchronized~~ ~~16 : watched~~ ~~17 : un-watched~~ ~~18 : existence doubtful~~ ~~19 : buoyed~~	

Comment [j324]: S-57 Extension 06/01.

Category of small craft facility: IHO Definition:

1) **Visitor's berth**

   IHO Definition: A berth set aside for the use of visiting vessels.

2) **Nautical club**

   IHO Definition: A club for mariners generally associated with other small craft facilities.

3) **Boat hoist**

   IHO Definition: A hoist for lifting boats out of the water (also known as a travel lift).

Comment [j325]: MD8 – 3.Cl.5 and 3.Co.4.

4) **Sailmaker**

   IHO Definition: A place where sails are made or may be taken for repair.

5) **Boatyard**

   IHO Definition: A place on shore where boats may be built, stored and repaired.

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.

10) **Doctor**

    IHO Definition: A place where a doctor is available to provide medical attention.

11) **Pharmacy**

    IHO Definition: A place where medical drugs are dispensed.

12) **Water tap**

    IHO Definition: A place where fresh water is available.

13) **Fuel station**

    IHO Definition: A place where fuel is available.

14) **Electricity**

    IHO Definition: A place where a connection to an electrical supply is available.

15) **Bottle gas**

    IHO Definition: A place where bottled gas is available.

16) **Showers**

IHO Definition: A place where showers are available..

17) **Launderette**

IHO Definition: A place where there are facilities for washing clothes.

18) **Public toilets**

IHO Definition: A place where toilets are available for public use.

19) **Post box**

IHO Definition: A place where mail may be posted.

20) **Public telephone**

IHO Definition: A place where a telephone is available for public use.

21) **Refuse bin**

IHO Definition: A place where refuse may be dumped.

22) **Car park**

IHO Definition: A place where cars may be parked.

23) **Parking for boats and trailers**

IHO Definition: A place on shore where boats and/or trailers may be parked.

24) **Caravan site**

IHO Definition: A place where caravans may be parked or where caravan accommodation is provided.

25) **Camping site**

IHO Definition: A place where visitors may pitch tents and camp.

26) **Sewerage pump-out station**

IHO Definition: A place where sewerage may be pumped off a vessel.

27) **Emergency telephone**

IHO Definition: A place where a telephone is available for emergency use only.

28) **Landing/launching place for boats**

IHO Definition: A place where boats may be landed or launched.

29) **Visitors mooring**

IHO Definition: A mooring set aside for the use of visiting vessels.

30) **Scrubbing berth**

IHO Definition: A place where vessels may berth for the purpose of careening.

31) **Picnic area**

IHO Definition: A place where people may go to eat a picnic.

32) **Mechanics workshop**

IHO Definition: A place where mechanical repairs can be undertaken to engines or other vessel equipment.

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.

INT 1 Reference: U 2, 3-4, 6-13, 15-31

21.7.1 Small craft facilities

If it is required to encode a small craft facility, it must be done using the feature **SMCFAC**.

Geo feature: Small craft facility (**SMCFAC**)

Attributes:						
	CATSCF	NOBJNM	OBJNAM	PEREND	PERSTA	STATUS
	INFORM	NINFOM	NTXTDS	PICREP	SCAMIN	TXTDSC
	RECDAT	RECIND	SORDAT	SORIND		

Remarks:

- The **SMCFAC** 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 feature (e.g. **BUISGL**, **MORFAC**).

Distinction: Building, single; harbour facility; shoreline construction.