3   ENC Metadata

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

These meta features are in the following list:

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

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

Quality of Bathymetric Data: The meta feature **Quality of Bathymetric Data** defines areas within which uniform assessment exists for the quality of bathymetric data, and is used to provide an assessment of the overall quality of bathymetric data to the mariner. Areas of a dataset at maximum display scale 1:700000 and larger containing depth data or bathymetry must be covered by one or more **Quality of Bathymetric Data** features, which must not overlap. See clause X.X.

3.1 Quality of non-bathymetric data

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

S-101 Geo Feature: Quality of non-bathymetric data (M_ACCY)

Primitives: Surface

Real World	Paper Chart Symbol	ECDIS Symbol

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

INT 1 Reference:

3.1.1 Quality of positions

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

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

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

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

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

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

Remarks:
- No remarks.

3.1.2   Horizontal accuracy

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

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

Remarks:
- No remarks.

3.1.3   Vertical accuracy

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

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

Remarks:
- No remarks.

3.1.4   Source of non-bathymetric data

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

Remarks:
- No remarks.

Distinction: Quality of data; quality of survey.

3.2 Compilation scale of data

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

S-101 Geo Feature: Compilation Scale of Data (M_CSCL)

Primitives: Surface

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

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

INT 1 Reference:

3.2.1 Compilation scale

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

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

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

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

Selectable Range	Standard scale (rounded)
200 NM	1:3000000
96 NM	1:1500000
48 NM	1:700000
24NM	1:350000

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

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

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

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

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

Distinction:

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

S-101 Geo Feature: Data Coverage (M_COVR)

Primitives: Surface

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of coverage	(CATCOV)	1 : coverage available 2 : no coverage available	EN	1,1
Maximum display scale		< 3000000 3000000 1500000 700000 350000 180000 90000 45000 22000 12000 8000 4000 > 4000 maximum display scale < minimum display scale	IN	1,1
Minimum display scale		< 3000000 3000000 1500000 700000 350000 180000 90000 45000 22000 12000 8000 4000 > 4000 minimum display scale > maximum display scale	IN	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1

Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference:

3.3.1 Coverage

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

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

The mandatory attribute **minimum display scale** is used to indicate the smallest intended viewing scale for the data. Where an empty (null) value is populated for **minimum display scale**, the ECDIS will continue to display the data regardless of how small the user selected viewing scale becomes.   The value populated for **minimum display scale**, therefore, is intended to be used in a series of ENC cells covering a geographic area to determine the dataset loading strategy as the user selected viewing scale becomes larger.

Typically, only a single **Data Coverage** feature should be used in a data set. However, if the maximum display scale is different for discrete areas within a single ENC dataset, this must be indicated by encoding separate, non-overlapping **Data Coverage** features, each having a different value populated for **maximum display scale**. Producing Authorities are to note, however, that excessive use of multiple **Data Coverage** features having different values of **maximum display scale** within a single dataset must be avoided. Where different values of **maximum display scale** are used, this should be restricted only to data compiled in order to achieve the intended navigational purpose of the entire dataset. If populated, datasets must have the same value for **minimum display scale** for all **Data Coverage** features in the dataset.

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

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

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

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

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

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

Remarks:
- This meta feature is intended to support an indication of coverage.
- Where more than one **Data Coverage** feature exists for a dataset, the dataset, when loaded, will be displayed in the ECDIS at a display scale corresponding to the largest scale value populated for **maximum display scale**.
- Where a data set consists of only one **Data Coverage** feature, the value for the maximum display scale populated in the dataset discovery metadata must be the same as the value populated for **maximum display scale** on the **Data Coverage**.

Distinction:

3.4   Nautical publication information

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

S-101 Geo Feature: Nautical Publication Information (M_NPUB)

Primitives: Point, Surface

Real World	Paper Chart Symbol	ECDIS Symbol

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

INT 1 Reference:

3.4.1   Reference to other publications

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

Remarks:
- References to nautical publications in **Nautical Publication Information**, must be encoded using the attribute **publication reference**, and references to external picture files must be encoded using the attribute **pictorial representation**.
- **Nautical Publication Information** should also be used to encode information which may be of use to the mariner, but is not significant to safe navigation and cannot be encoded using existing feature classes, using the complex attributes **information** and/or **textual description** (see clause X.X). This is intended to reduce the number of alarms or indications generated in the ECDIS due to the overuse of **Caution Area** features (see clause X.X). The area covered by a **Nautical Publication Information** feature should be the equivalent of the area for which the information is relevant.

Distinction:

3.5 Navigational system of marks

<table>
<tr><td colspan="6">IHO Definition: NAVIGATIONAL SYSTEM OF MARKS. An area within which a specific system of navigational marks applies and/or a common direction of buoyage. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.214, November 2000).</td></tr>
<tr><td colspan="6">S-101 Geo Feature: Navigational system of marks (M_NSYS)</td></tr>
<tr><td colspan="6">Primitives: Surface</td></tr>
<tr><td colspan="2"><i>Real World</i></td><td colspan="2"><i>Paper Chart Symbol</i></td><td colspan="2"><i>ECDIS Symbol</i></td></tr>
</table>

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Marks navigational – system of	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 10 : other system 11 : CEVNI	EN	0,1
Orientation			C	0,1
Orientation uncertainty			(S) RE	0,1
Orientation value	(ORIENT)		(S) RE	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference:
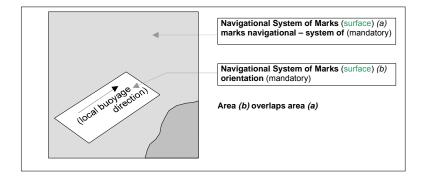
3.5.1 Buoyage systems and direction of buoyage (see S-4 – B-461)

The buoyage system of the dataset and, where necessary, the direction of buoyage, must be encoded using the meta feature **Navigational System of Marks**:

All parts of the dataset containing data must be covered by **Navigational System of Marks** features, with the attribute **marks navigational – system of** indicating the buoyage system in operation. **Navigational System of Marks** with a value encoded for MARSYS must not overlap.

Within a dataset, there may be some areas where the direction of buoyage is defined by local rules and must, therefore, be specified. These areas should be encoded as separate **Navigational System of Marks** surface features, with the complex attribute **orientation** indicating the direction of buoyage (**marks navigational – system of** must not be encoded for these features). **Navigational System of Marks** features with a value

encoded for **orientation** (orientation value) must not overlap, but in areas where local buoyage directions apply, **Navigational System of Marks** with a value encoded for **orientation** (orientation value) may overlap **Navigational System of Marks** with a value encoded for **marks navigational – system of** (see Figure below).

Buoyage system and direction

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

Remarks:
- At least one of the attributes **marks navigational – system of** or **orientation** must be populated for **Navigational System of Marks** features.
- The attribute SCAMIN must not be populated for **Navigational System of Marks** features having a value for **marks navigational – system of**.

3.5.1.1   Encoding IALA marks within IALA A or B

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

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

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

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

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

<u>Distinction:</u>

3.6   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. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.216, November 2000).		

S-101 Geo Feature: Quality of Bathymetric Data (M_QUAL)

Primitives: Surface

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
~~Category of zone of confidence in data~~	~~(CATZOC)~~	~~1 : zone of confidence A1~~ ~~2 : zone of confidence A2~~ ~~3 : zone of confidence B~~ ~~4 : zone of confidence C~~ ~~5 : zone of confidence D~~ ~~6 : zone of confidence U~~ ~~(data not assessed)~~	~~EN~~	~~1,1~~
Category of temporal variation		1 : unassessed 2 : event 3 : likely to change 4 : unlikely to change	EN	1,1
Depth range maximum value	(DRVAL2)		RE	0,1
Depth range minimum value	(DRVAL1)		RE	0,1
Features detected			C	1,1
Least depth of detected features measured			(S) BO	0,1
Significant features detected			(S) BO	1,1
Size of features detected			(S) RE	0,1
Positional uncertainty	(POSACC)		RE	0,1
Full seafloor coverage			BO	1,1
Sounding uncertainty	(SOUACC)		RE	0,1
Survey date range			C	1,1
Date end	(SUREND)	ISO 8601:1988	(S) DA	0,1
Date start	(SURSTA)	ISO 8601:1988	(S) DA	0,1
Technique of sounding measurement	(TECSOU)	1 : found by echo-sounder 2 : found by side scan sonar 3 : found by multi-beam 4 : found by diver 5 : found be lead-line 6 : swept by wire-drag 7 : found by laser 8 : swept by vertical acoustic system 9 : found by electromagnetic sensor 10 : photogrammetry 11 : satellite imagery 12 : found by levelling 13 : swept by side-scan sonar 14 : computer generated	EN	0,*

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

INT 1 Reference:

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

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

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

For the mariner, **Quality of Bathymetric** Data provides the most useful information. Therefore, the use of **Quality of Bathymetric** Data is mandatory for areas containing depth data or bathymetry on ENC datasets at maximum display scale 1:700000 and larger.

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

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

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

Remarks:

- To express completeness of bathymetric data, the complex attribute **full seafloor coverage** must be encoded. **Full seafloor coverage** indicates that a systematic method of exploring the sea floor was undertaken to detect significant features. The sub-attributes **size of features detected** and **least depth of detected features measured** must not be encoded unless the sub-attribute **significant features detected** is set to *True*.
- Wherever possible, meaningful and useful values for the attributes **category of temporal variation**, **full seafloor coverage**, and the complex attribute **features detected** must be used for areas of bathymetry. For areas of unstable seafloors, the complex attribute **survey date range** (**date end**) must be used to indicate the date of the survey of the underlying bathymetric data.
- **Depth range minimum value** must only be used on a **Quality of Bathymetric** Data feature where a swept area occupies the entire **Quality of Bathymetric** Data surface.
- **Depth range maximum value** must only be used on a **Quality of Bathymetric** Data feature to specify the maximum depth to which all other attributes for the **Quality of Bathymetric Data** feature applies. When **depth range maximum value** is specified, values populated for all other attributes apply only to depths equal to or shoaler than **depth range maximum value**. No quality information is provided for depths

deeper than **depth range maximum value**.

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

3.6.1.1　Feature detection

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

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

3.6.1.2　Temporal variation

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

3.6.1.3　Sounding accuracy

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

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

3.6.1.4　Technique of sounding measurement

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

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

Distinction: Accuracy of data; quality of survey.

3.7   Sounding datum

<u>IHO Definition:</u> **SOUNDING DATUM**. An area of uniform sounding datum. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.217, November 2000).				
<u>**S-101 Geo Feature:**</u> **Sounding datum (M_SDAT)**				
<u>**Primitives:**</u> **Surface**				
Real World	*Paper Chart Symbol*		*ECDIS Symbol*	

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

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

INT 1 Reference:

3.7.1 Sounding datum

Sounding datum information is encoded in the dataset metadata or by the meta feature **Sounding Datum**, and must be constant over large areas. The values encoded in the attributes **value of sounding**, **depth range minimum value**, **depth range maximum value** and **value of depth contour**, and the sounding values encoded in **Sounding** features (positive values down), are referenced to this datum.

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

If the sounding datum for an area is different to the value given in the [VDAT] subfield for the dataset, it must be encoded using **Sounding Datum**. The areas covered by these meta features must not overlap. If it is required to encode a sounding datum for individual features that is different from the dataset header, or a **Sounding Datum** feature covering the features, it must encoded using the attribute **vertical datum** on the individual features.

Depth contours, grouped soundings 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 **Marine Farm/Culture**, **Obstruction** and **Wreck**, but only where the value of **value of sounding** is known; and **Berth**, **Cable Submarine**, **Deep Water Route Centreline**, **Deep Water Route Part**, **Dredged Area**, **Dry Dock**, **Fairway**, **Floating Dock**, **Gate**, **Pipeline Submarine/On Land**, **Recommended Route Centreline**, **Recommended Track**, **Swept Area**, **Two-Way Route Part** and **Quality of Bathymetric Data**, but only if the value of **depth range minimum value** and/or **depth range maximum value** is known.

Remarks:
- No remarks.

Distinction: Vertical datum.

Comment [j4]: These clauses need to be sorted out in regard to how vertical and sounding datums are going to work in S-101.

3.8   Quality of survey

IHO Definition: **QUALITY OF SURVEY**. An area within which a uniform assessment of the reliability of source survey information exists. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.218, November 2000).

S-101 Geo Feature: Quality of survey (M_SREL)

Primitives: Curve, Surface

Real World	*Paper Chart Symbol*	*ECDIS Symbol*		
S-101 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Features detected			C	0,1
Least depth of detected features measured			(S) BO	0,1
Significant features detected			(S) BO	1,1
Size of features detected			(S) RE	0,1
Full seafloor coverage			BO	1,1
Line spacing maximum	(SDISMX)		IN	0,1
Line spacing minimum	(SDISMN)		IN	0,1
Measurement distance maximum			RE	0,1
Measurement distance minimum			RE	0,1
Quality of position	(QUAPOS)	1 : surveyed 2 : unsurveyed 3 : inadequately surveyed 4 : approximate 5 : position doubtful 6 : unreliable 7 : reported (not surveyed) 8 : reported (not confirmed) 9 : estimated 10 : precisely known 11 : calculated	EN	0,1
Quality of sounding measurement	(QUASOU)	1 : depth known 2 : depth or least depth unknown 3 : doubtful sounding 4 : unreliable sounding 6 : least depth known 7 : least depth unknown, safe clearance at value shown 8 : value reported (not surveyed) 9 : value reported (not confirmed) 10 : maintained depth 11 : not regularly maintained	EN	0,*
Scale value maximum	(SCVAL1)	scale value maximum < scale value minimum	IN	0,1
Scale value minimum	(SCVAL2)	scale value minimum > scale value maximum	IN	0,1
~~Sounding distance maximum~~	~~(SDISMX)~~		~~IN~~	~~0,1~~

Sounding distance minimum	(SDISMN)		IN	0,1
Survey authority	(SURATH)		TE	1,1
Survey date range			C	1,1
Date end	(SUREND)	ISO 8601:1988	(S) DA	0,1
Date start	(SURSTA)	ISO 8601:1988	(S) DA	0,1
Survey type	(SURTYP)	1 : reconnaissance / sketch survey 2 : controlled survey 4 : examination survey 5 : passage survey 6 : remotely sensed 7 : full coverage 8 : systematic survey 9 : non-systematic survey 10 : inadequately surveyed 11 : spot-sounding survey 12 : acoustically swept survey 13 : mechanically swept survey	EN	1,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

<u>INT 1 Reference</u>:

3.8.1   Survey reliability and source of bathymetric data

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

<u>Remarks:</u>

- To express completeness of bathymetric data, the complex attribute **features detected** should be encoded. **features detected** indicates that a systematic method of exploring the sea floor was undertaken to detect significant features. The sub-attributes **size of features detected** and **least depth of detected features measured** must not be encoded unless the sub-attribute **significant features detected** is set to *True*.
- If the attributes **sounding uncertainty** and **technique of sounding measurement** are required, they must be encoded on either the meta feature **Quality of Bathymetric Data** or on individual geo features (e.g. **Sounding**).
- If it is required to encode details of the survey authority, it must be done using the attribute **survey authority**, and must not be encoded using the attribute **source indication**.
- If a feature has a source different to that given by the underlying **Quality of Survey**, this other source should be encoded using both the attributes **source indication** and **source date** on the feature, but only if this information is considered to be useful to the mariner.
- If the attribute **measurement distance maximum** is set to *0* (zero) for the full area of the survey, the attribute **full seafloor coverage achieved** should be set to *yes*.

- Where populated, the value for the attribute **measurement distance minimum** must not be larger than the value populated for **measurement distance maximum**.
- **Quality of position** on the **Quality of Survey** applies to bathymetric data situated within the area, while **quality of position** or **positional uncertainty** on the associated spatial types qualifies the location of the **Quality of Survey** feature itself.

3.8.2 Quality of sounding

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

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

Remarks:
- No remarks.

Distinction: Accuracy of data; quality of bathymetric data

3.9   Vertical datum

IHO Definition: **VERTICAL DATUM**. An area of uniform vertical datum. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.218, November 2000).
S-101 Geo Feature: Vertical datum of data (M_VDAT)
Primitives: Surface

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

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

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

INT 1 Reference:

3.9.1   Vertical datum

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

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

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

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

Various height datums may be used within an ENC. For example, different datums may be used for the following:
- altitude of spot heights, height contours, landmarks,
- elevation of lights,
- vertical clearance.

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

Remarks:
- No remarks.

Distinction: Sounding datum.

3.10   Update information

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

S-101 Geo Feature: Update information

Primitives: Point, Curve, Surface

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

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

Comment [A5]: Note: Update source from proposal not included.

Comment [A6]: Is there a requirement to include this (and other feature associations) in a separate section. Same for Roles.

INT 1 Reference:

3.10.1 Update information

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

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

Distinction: Information area; caution area.

4   Magnetic Data

4.1   Local Magnetic Anomaly

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

<u>**S-101 Geo Feature:**</u> **Local magnetic anomaly (LOCMAG)**

<u>**Primitives:**</u> **Point, Curve, Surface**

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

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

INT 1 Reference: B 82.1-2

4.1.1   Abnormal magnetic variation (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 **Local Magnetic Anomaly**.

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 **information** (e.g. *From -27 degrees to 3 degrees*).

Remarks:
- Where the mandatory complex attribute **value of local magnetic anomaly** contains a value in the sub-attribute **magnetic anomaly value maximum** only, the deviation is assumed to be positive and negative by that amount. Where the positive and negative values for the local magnetic anomaly differ, the positive value must be populated in **anomaly value maximum**, and the negative value in the sub-attribute **magnetic anomaly value minimum**. The plus/minus character must not be encoded.
- Abnormal magnetic variation should not be encoded unless it varies by more than about 3° from the normal magnetic variation (see clause X.X) for the area.

Distinction: Magnetic variation.

4.2   Magnetic Variation

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

S-101 Geo Feature: Magnetic variation (MAGVAR)

Primitives: Point, Curve, Surface

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

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

INT 1 Reference: B 68, 70-71

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

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

Remarks:
* There remains a requirement to include magnetic variation information in ENCs whilst SOLAS regulations include the requirement for a magnetic compass and deviation card. User feedback indicates that it can be difficult to access magnetic variation information in ECDIS where it has been encoded using the point or

curve primitive. In order to make magnetic variation information easily accessible to ECDIS users, it is recommended to encode this information as **Magnetic Variation** features of type surface. Encoding this information using the surface primitive ensures that the user can interrogate the ENC data using the ECDIS Pick Report function at any chart location to identify the value of magnetic variation at that location.

- The mandatory attribute **reference year for magnetic variation** must be used to populate the year value only (see clause X.X for format of date type attributes).

- Magnetic models are typically replaced every five years (e.g. 2005, 2010… termed epochs). Magnetic variation can be calculated from computer models, or derived from charts produced by certain Hydrographic Offices or mapping authorities, which show the spatial distribution of magnetic variation values worldwide for the current epoch, by means of lines of equal magnetic variation (termed isogonals). The rate-of-change curves, which are over-printed on such charts, enable values for any point to be extrapolated for any time within the current epoch.

- **Magnetic Variation** features of type curve (isogonals) should be encoded at 1°, 2°, or 5° intervals so that spacing does not generally exceed 150mm at the maximum display scale of the ENC data. Isogonals should not be inserted at intervals of less than 1°, because diurnal and seasonal fluctuations in the earth's magnetic field can change the stated variation by up to 1° and, in some parts of the world, the data on which isogonals are based may not ensure the accuracy of charted values to better than ±2°. Where isogonals cannot be encoded such that the spacing does not exceed 150mm at the maximum display scale of the ENC data, **Magnetic Variation** of type point should be encoded.

- When populating the attribute **value of annual change in magnetic variation**, a positive value, i.e. unsigned, indicates a change in an easterly direction and a negative value indicates a change in a westerly direction.

- When populating the attribute **value of magnetic variation**, a positive value, i.e. unsigned, indicates variation in a easterly direction and a negative value indicates variation in a westerly direction.

Distinction: Local magnetic anomaly.

5   Natural Features

The use of Global Navigation Satellite Systems (GNSS) as an integral component of ECDIS has raised questions as to the level of topographic detail that is required in ENCs to enable safe navigation using ECDIS. When determining the topographic information necessary for inclusion in ENC, all operational conditions of vessels must be taken into consideration, including the potential for corruption or failure of a vessel's GNSS reception. Such a failure would require the mariner to navigate by fixing their position using traditional methods, necessitating a sufficient level of depiction of topographic detail in the ENC to facilitate navigation using these methods, appropriate to the Navigational Purpose of the ENC.

In addition, mariners will continue to use visual or radar fixing as an independent method of confirming the position of their vessel as shown on the ECDIS, in order to gain a greater level of confidence in terms of their navigation.

Encoders are advised, therefore, that when determining the level of depiction of topographic detail required for ENC, this should be done in accordance with the principles described in S-4 section B-300 – Topography.

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).

S-101 Geo Feature: Coastline (COALNE)

Primitives: Curve

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of coastline	(CATCOA)	1 : steep coast 2 : flat coast 3 : sandy shore 4 : stony shore 5 : shingly shore 6 : glacier (seaward end) 7 : mangrove 8 : marshy shore 9 : coral reef 10 : ice coast 11 : shelly shore	EN	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Nature of surface	(NATSUR)	1 : mud 2 : clay 3 : silt 4 : sand 5 : stone 6 : gravel 7 : pebbles 8 : cobbles 9 : rock 11 : lava 14 : coral 17 : shells 18 : boulder	(S) EN	0,*

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

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

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

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

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

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

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

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

A steep coast may give a good radar return and is useful for visual identification from a considerable distance off, particularly where cliffs alternate with low lying coast along the shoreline.

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

> **Comment [j7]:** S-58 Test 51.

attribute **quality of position** = *4* (approximate). If it is required to encode the area of the marsh, this must be done using **Vegetation** (see clause X.X).

- If the seaward edge of an encoded saltpan area is coincident with the coastline, it should be encoded using **Coastline**, with **category of coastline** = *2* (flat coast).
- If the seaward edge of an encoded glacier is coincident with the coastline, this edge should be encoded using **Coastline**, with **category of coastline** = *6* (glacier (seaward end)).
- Where the source indicates the top of a cliff is coincident with the coastline at the maximum display scale of the ENC data (see INT1   C3), a **Coastline** feature, with **category of coastline** = *1* (steep coast) should be encoded. In such cases, there should be no **Slope Topline** or **Sloping Ground** features encoded, in order to avoid clutter. If it is required to indicate that such a section of the coastline provides a good radar return, it must be done using attribute **radar conspicuous** on the **Coastline** feature. If it is required to encode a section of the coastline that is visually conspicuous, it must be done using attribute **visually conspicuous** on the **Coastline** feature.
- If, the source indicates that the top of a coastal cliff is offset inshore from the coastline at the maximum display scale of the ENC data, a **Slope Topline** feature (see clause X.X) and/or a **Sloping Ground** feature (see clause X.X) may be encoded. In such cases, the **Coastline** feature should not have a value populated for **category of coastline**. If it is required to indicate that such a section of the coastline provides a good radar return, it must be done using attribute **radar conspicuous** on the **Slope Topline** and/or **Sloping Ground** feature. If it is required to encode a section of the coastline that is visually conspicuous, it must be done using attribute **visually conspicuous** on the **Slope Topline** and/or **Sloping Ground** feature.

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

5.2   Land area

<table>
<tr><td colspan="5">IHO Definition: LAND AREA. The solid portion of the Earth's surface, as opposed to sea, water. (IHO Dictionary – S-32).</td></tr>
<tr><td colspan="5"><u>S-101 Geo Feature:</u> Land area (LNDARE)</td></tr>
<tr><td colspan="5"><u>Primitives:</u> Point, Curve, Surface</td></tr>
<tr><td colspan="2"><i>Real World</i></td><td colspan="2"><i>Paper Chart Symbol</i></td><td><i>ECDIS Symbol</i></td></tr>
<tr><td>S-101 Attribute</td><td>S-57 Acronym</td><td>Allowable Encoding Value</td><td>Type</td><td>Multiplicity</td></tr>
<tr><td>Condition</td><td>(CONDTN)</td><td>1 : under construction
3 : under reclamation
5 : planned construction</td><td>EN</td><td>0,1</td></tr>
<tr><td>Feature name</td><td></td><td></td><td>C</td><td>0,*</td></tr>
<tr><td>Category of name</td><td></td><td>1 : official name
2 : alternate name
3 : common name
4 : short name
5 : display name</td><td>(S) EN</td><td>0,1</td></tr>
<tr><td>Display name</td><td></td><td></td><td>(S) BO</td><td>0,1</td></tr>
<tr><td>Language</td><td></td><td>ISO 639-3</td><td>(S) TE</td><td>0,1</td></tr>
<tr><td>Name</td><td>(OBJNAM)</td><td></td><td>(S) TE</td><td>1,1</td></tr>
<tr><td>Status</td><td>(STATUS)</td><td>6 : reserved
7 : temporary
8 : private
12 : illuminated
14 : public
16 : watched
17 : un-watched
18 : existence doubtful</td><td>EN</td><td>0,*</td></tr>
<tr><td>Information</td><td></td><td></td><td>C</td><td>0,*</td></tr>
<tr><td>Language</td><td></td><td>ISO 639-3</td><td>(S) TE</td><td>0,1</td></tr>
<tr><td>Text</td><td>(INFORM)</td><td></td><td>(S) TE</td><td>1,1</td></tr>
<tr><td>Textual description</td><td></td><td></td><td>C</td><td>0,*</td></tr>
<tr><td>File reference</td><td>(TXTDSC)</td><td></td><td>(S) TE</td><td>1,1</td></tr>
<tr><td>Language</td><td></td><td>ISO 639-3</td><td>(S) TE</td><td>0,1</td></tr>
<tr><td>Scale minimum</td><td>(SCAMIN)</td><td>See clause X.X</td><td>IN</td><td>0,1</td></tr>
<tr><td>Recording date</td><td>(RECDAT)</td><td>ISO 8601:1988</td><td>DA</td><td>0,1</td></tr>
<tr><td>Recording indication</td><td>(RECIND)</td><td></td><td>TE</td><td>0,1</td></tr>
<tr><td>Source indication</td><td></td><td></td><td>C</td><td>0,*</td></tr>
<tr><td>Authority</td><td></td><td></td><td>(S) TE</td><td>1,1</td></tr>
<tr><td>Nationality</td><td></td><td></td><td>(S) TE</td><td>1,1</td></tr>
<tr><td>ID code</td><td></td><td></td><td>(S) TE</td><td>0,1</td></tr>
<tr><td>Source</td><td></td><td></td><td>(S) TE</td><td>0,1</td></tr>
<tr><td>Source date</td><td>(SORDAT)</td><td>ISO 8601:1988</td><td>(S) DA</td><td>1,1</td></tr>
<tr><td colspan="5"><u>INT 1 Reference:</u> K 10</td></tr>
</table>

5.2.1　Land area

Land areas that are never covered by the sea must be encoded using the feature **Land Area**.

Rivers, canals, lakes, basins and docks, which are not navigable at the maximum display scale for the ENC data, must be encoded on top of **Land Area** or **Unsurveyed Area** features (see clause X.X).

Remarks:
- If it is required to describe the natural scenery of the land, it must be done using the feature **Land Region** (see clause X.X).
- **Land Area** is usually of type surface; it may, however, be of type point (e.g. islet, rock that does not cover), or of type curve (e.g. islet, offshore bar, isthmus).
- **Land Area** of type curve or point must not be encoded on top of **Land Area** of type surface, unless it is also covered by a **Lake**, **River**, **Dock Area**, **Lock Basin** or **Canal** feature of type surface.
- The limits of a **Land Area** of type surface must share the geometry of at least one of the following features:
  - **Coastline**, **Shoreline Construction**, **Gate**, **Dam** of type curve;
  - **Data Coverage**, **Gate**, **Dam**, **River**, **Tunnel**, **Dry Dock**, **Canal**, **Lake**, **Lock Basin**, **Dock Area**, **Land Area** of type surface;
  - **Causeway**, **Shoreline Construction**, **Mooring/Warping Facility**, **Wreck**, **Obstruction**, **Pylon/Bridge Support** of type surface; and having attribute **water level effect** = *1* (partly submerged at high water), *2* (always dry) or *6* (subject to inundation or flooding).
- **Land Area** features of type surface are part of the Skin of the Earth.

5.2.2　Rocks which do not cover (islets) (see S-4 – B-421.1)

A surface feature must be encoded using:
- A **Land Area** feature of type surface (mandatory)
- **Coastline** or **Shoreline Construction** features of type curve (mandatory)
- **Land Elevation** features of type curve and/or point (optional)

A curve feature must be encoded using:
- A **Land Area** feature of type curve (mandatory)
- **Land Elevation** features of type point (optional)

A point feature must be encoded using:
- A **Land Area** feature of type point (mandatory)
- A **Land Elevation** feature of type point (optional)

Distinction:　Canal; coastline; depth area; lake; land region; river; seabed area; shoreline construction; vegetation.

Comment [j8]: S-58 check 55.

Comment [j9]: S-58 check 1565.

5.3   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).	
S-101 Geo Feature: Land elevation (LNDELV)	
Primitives: Point, Curve	

Real World	Paper Chart Symbol	ECDIS Symbol

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

INT 1 Reference: C 10-13

5.3.1   Height contours, spot heights (see S-4 – B-351 and B-352.1-2)

It is assumed that mariners will understand most methods of representation of relief with little difficulty. In general it is assumed that Producing Authorities will choose the representation of relief most suitable to the terrain being charted and the navigational requirements. It is therefore left to national discretion to:
- omit all relief representation, except dykes and sea walls;
- omit all relief representation, except spot heights and cliffs;
- show relief by contours (and spot heights); or

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

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

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

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

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

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

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

Distinction: Slope topline; sloping ground.

5.4   River

IHO Definition: **RIVER**. A relatively large natural stream of water. (IHO Dictionary – S-32)				
S-101 Geo Feature: River (RIVERS)				
Primitives: Curve, Surface				
Real World	*Paper Chart Symbol*		*ECDIS Symbol*	

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Status	(STATUS)	~~2 : occasional~~ 5 : periodic/intermittent 8 : private 14 : public	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
~~Recording date~~	~~(RECDAT)~~	~~ISO 8601:1988~~	~~DA~~	~~0,1~~
~~Recording indication~~	~~(RECIND)~~		~~TE~~	~~0,1~~
~~Source indication~~			~~C~~	~~0,*~~
~~Authority~~			~~(S) TE~~	~~1,1~~
~~Nationality~~			~~(S) TE~~	~~1,1~~
~~ID code~~			~~(S) TE~~	~~0,1~~
~~Source~~			~~(S) TE~~	~~0,1~~
~~Source date~~	~~(SORDAT)~~	~~ISO 8601:1988~~	~~(S) DA~~	~~1,1~~

INT 1 Reference: C 20, 21

5.4.1   Rivers (see S-4 – B-353)

Inland navigable waters must be compiled as fully as practicable, consistent with the maximum display scale of the ENC data. Other rivers should be compiled only in a limited way to assist in providing a general indication of the topography (except close to the coastline where they may be of direct significance to the mariner).

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

Remarks:

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

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

5.5   Rapids

<u>IHO Definition:</u> **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).

<u>**S-101 Geo Feature:**</u> Rapids (RAPIDS)

<u>**Primitives:**</u> Point, Curve, Surface

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

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

<u>INT 1 Reference:</u> C 22

5.5.1   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**.

<u>Remarks:</u>
- The area covered by rapids must also be covered by a **River** feature (see clause X.X), and a **Land Area** or **Unsurveyed Area** feature.

<u>Distinction:</u>   Current – non-gravitational; tidal stream – harmonic prediction; tidal stream – non-harmonic prediction; tidal stream panel data; tidal stream – time series; water turbulence; waterfall.

5.6   Waterfall

<table>
<tr><td colspan="5">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).</td></tr>
<tr><td colspan="5"><u>S-101 Geo Feature:</u> Waterfall (WATFAL)</td></tr>
<tr><td colspan="5"><u>Primitives:</u> Point, Curve</td></tr>
<tr><td colspan="2"><i>Real World</i></td><td colspan="2"><i>Paper Chart Symbol</i></td><td><i>ECDIS Symbol</i></td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>S-101 Attribute</td><td>S-57 Acronym</td><td>Allowable Encoding Value</td><td>Type</td><td>Multiplicity</td></tr>
<tr><td>Feature name</td><td></td><td></td><td>C</td><td>0,*</td></tr>
<tr><td>Category of name</td><td></td><td>1 : official name
2 : alternate name
3 : common name
4 : short name
5 : display name</td><td>(S) EN</td><td>0,1</td></tr>
<tr><td>Display name</td><td></td><td></td><td>(S) BO</td><td>0,1</td></tr>
<tr><td>Language</td><td></td><td>ISO 639-3</td><td>(S) TE</td><td>0,1</td></tr>
<tr><td>Name</td><td>(OBJNAM)</td><td></td><td>(S) TE</td><td>1,1</td></tr>
<tr><td>Vertical length</td><td>(VERLEN)</td><td></td><td>RE</td><td>0,1</td></tr>
<tr><td>Visually conspicuous</td><td>(CONVIS)</td><td></td><td>BO</td><td>0,1</td></tr>
<tr><td>Information</td><td></td><td></td><td>C</td><td>0,*</td></tr>
<tr><td>Language</td><td></td><td>ISO 639-3</td><td>(S) TE</td><td>0,1</td></tr>
<tr><td>Text</td><td>(INFORM)</td><td></td><td>(S) TE</td><td>1,1</td></tr>
<tr><td>Textual description</td><td></td><td></td><td>C</td><td>0,*</td></tr>
<tr><td>File reference</td><td>(TXTDSC)</td><td></td><td>(S) TE</td><td>1,1</td></tr>
<tr><td>Language</td><td></td><td>ISO 639-3</td><td>(S) TE</td><td>0,1</td></tr>
<tr><td>Scale minimum</td><td>(SCAMIN)</td><td>See clause X.X</td><td>IN</td><td>0,1</td></tr>
<tr><td>Recording date</td><td>(RECDAT)</td><td>ISO 8601:1988</td><td>DA</td><td>0,1</td></tr>
<tr><td>Recording indication</td><td>(RECIND)</td><td></td><td>TE</td><td>0,1</td></tr>
<tr><td>Source indication</td><td></td><td></td><td>C</td><td>0,*</td></tr>
<tr><td>Authority</td><td></td><td></td><td>(S) TE</td><td>1,1</td></tr>
<tr><td>Nationality</td><td></td><td></td><td>(S) TE</td><td>1,1</td></tr>
<tr><td>ID code</td><td></td><td></td><td>(S) TE</td><td>0,1</td></tr>
<tr><td>Source</td><td></td><td></td><td>(S) TE</td><td>0,1</td></tr>
<tr><td>Source date</td><td>(SORDAT)</td><td>ISO 8601:1988</td><td>(S) DA</td><td>1,1</td></tr>
<tr><td colspan="5"><u>INT 1 Reference:</u> C 22</td></tr>
<tr><td colspan="5">5.6.1   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 Waterfall.

<u>Remarks:</u>
• The area covered by a waterfall must also be covered by a River feature, and a Land Area or Unsurveyed Area feature.</td></tr>
</table>

Distinction: Rapids.

5.7   Lake

IHO Definition: **LAKE**. A large body of water entirely surrounded by land. (IHO Dictionary – S-32).
S-101 Geo Feature: Lake (LAKARE)
Primitives: Surface

Real World	Paper Chart Symbol	ECDIS Symbol

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

INT 1 Reference: C 23

5.7.1   Lakes (see S-4 – B-353.6)

Inland navigable waters must be compiled as fully as practicable, consistent with the maximum display scale of the ENC data. Other lakes should be compiled only in a limited way to assist in providing a general indication of the topography (except close to the coastline where they may be of direct significance to the mariner).

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

Remarks:
- If the lake is navigable at the maximum display scale for the ENC data, it must be encoded using the feature **Depth Area** or **Dredged Area** (see clause X.X), and the lake shore must be encoded using the feature

Coastline or Shoreline Construction. The lake must not be encoded as a **Lake** feature in this case. If it is required to encode the name of the lake, it must be done using a **Sea Area/Named Water Area** feature, with attribute **category of sea area** = *52* (lake).

- If it is required to encode a lake that is not navigable at the maximum display scale for the ENC data, it must be done using **Lake**, covered by a **Land Area** or **Unsurveyed Area** feature. The name of the lake should be encoded using the complex attribute **feature name** on the **Lake** feature.

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

Distinction: Canal; depth area; river.

5.8   Land region

<table>
<tr><td colspan="5">IHO Definition: LAND REGION. An area of natural scenery defined by its geographical characteristics and may be known by its proper name. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.92, November 2000).</td></tr>
<tr><td colspan="5"><u>S-101 Geo Feature:</u> Land region (LNDRGN)</td></tr>
<tr><td colspan="5"><u>Primitives:</u> Point, Surface</td></tr>
<tr><td colspan="2"><i>Real World</i></td><td><i>Paper Chart Symbol</i></td><td colspan="2"><i>ECDIS Symbol</i></td></tr>
<tr><td>S-101 Attribute</td><td>S-57 Acronym</td><td>Allowable Encoding Value</td><td>Type</td><td>Multiplicity</td></tr>
<tr><td>Category of land region</td><td>(CATLND)</td><td>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</td><td>EN</td><td>0,*</td></tr>
<tr><td>Feature name</td><td></td><td></td><td>C</td><td>0,*</td></tr>
<tr><td>Category of name</td><td></td><td>1 : official name
2 : alternate name
3 : common name
4 : short name
5 : display name</td><td>(S) EN</td><td>0,1</td></tr>
<tr><td>Display name</td><td></td><td></td><td>(S) BO</td><td>0,1</td></tr>
<tr><td>Language</td><td></td><td>ISO 639-3</td><td>(S) TE</td><td>0,1</td></tr>
<tr><td>Name</td><td>(OBJNAM)</td><td></td><td>(S) TE</td><td>1,1</td></tr>
<tr><td>Nature of surface</td><td>(NATSUR)</td><td>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</td><td>(S) EN</td><td>0,*</td></tr>
<tr><td>Water level effect</td><td>(WATLEV)</td><td>1 : partly submerged at high water
2 : always dry
4 : covers and uncovers
6 : subject to inundation or</td><td>EN</td><td>0,1</td></tr>
</table>

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

INT 1 Reference: C 24, 26, 33

5.8.1   Natural sceneries (see S-4 – B-350)

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

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

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

No definite standards can be stated but the following principles should be observed:
- The density of topographic detail shown should be kept to a minimum consistent with providing navigators with all identifiable features and with a general picture of the relief as far as the probable skyline. This practice should enable landmarks to stand out from less important detail.
- Treatment of detail should vary with distance inland, e.g. inconspicuous features such as marshes and minor lakes and streams should be shown only when within about a mile of the coast.

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

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

the attribute **category of land region**, the generic term "Cape", "Point", "Peninsula", etc may be included on the attributes **feature name** and **feature name in national language**, unless the name has been populated on an underlying **Land Area**, in which case **Land Region** should not be encoded.

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

5.8.1.1 Marsh (see S-4 – B-312.2)

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

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

5.8.1.2 Salt pans (see S-4 – B-353.7)

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

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

5.8.1.3 Lava flow (see S-4 – B-355)

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

Distinction: Sea area; land area; vegetation.

5.9   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).
S-101 Geo Feature: Vegetation (VEGATN)
Primitives: Point, Curve, Surface

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of vegetation	(CATVEG)	1 : grass 3 : bush 4 : deciduous wood 5 : coniferous wood 6 : wood in general (inc. mixed wood) 7 : mangroves 10 : mixed crops 11 : reed 12 : moss 13 : tree in general 14 : evergreen tree 15 : conifer tree 16 : palm tree 17 : nipa palm tree 18 : casuarinas tree 19 : eucalypt tree 20 : deciduous tree 21 : mangrove tree 22 : filao tree	EN	1,1
Elevation	(ELEVAT)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1

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

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

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

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

The following features should be omitted from even the largest maximum display scale ENC data:
- Grassland, cultivated fields (including paddy fields), bushes.
- Trees along roads, fences, ditches, and scattered trees (unless landmarks).
- Woodland cover within urban areas (unless adjacent of the coast).
- Woodland cover which is the general ground cover and therefore useless for identification of position.

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

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

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

Remarks:
- The attribute **height** is used to encode the approximate altitude of the highest point of the top of the vegetation. Where the source shows an island with the approximate height of the top of the vegetation above height datum (see INT1 - C14), a **Vegetation** feature should be encoded co-incident with the **Land Area** feature of the island, with attribute **height** corresponding to the value shown on the source.
- Where the source indicates that a mangrove area is in the intertidal area, a **Vegetation** feature, with attribute **category of vegetation** = *7* (mangroves) should be encoded on top of the intertidal area (**Depth Area** with attributes **depth range minimum value** = *-H* and **depth range maximum value** = *0* – see clause X.X). The seaward spatial edge(s) of the mangrove area should have the spatial attribute **quality of position** = *4* (approximate). The landward edge of the mangrove area should be encoded as **Coastline** (see clause X.X), having no value populated for the attribute **category of coastline**, and no value for **quality of position** on the related spatial edge(s).

Distinction: Seabed area; weed/kelp.

5.10   Ice area

IHO Definition: **ICE AREA**. An area of ice over land or water. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.84, November 2000).
S-101 Geo Feature: ice area (ICEARE)
Primitives: Surface

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of ice	(CATCHP)	1 : fast ice 5 : glacier 8 : polar ice	EN	1,1
Elevation	(ELEVAT)		RE	0,1
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Status	(STATUS)	1 : permanent ~~2 : occasional~~ 5 : periodic/intermittent 16 : watched 17 : un-watched 18 : existence doubtful	EN	0,*
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
~~Recording date~~	~~(RECDAT)~~	~~ISO 8601:1988~~	~~DA~~	~~0,1~~
~~Recording indication~~	~~(RECIND)~~		~~TE~~	~~0,1~~
~~Source indication~~			~~C~~	~~0,*~~
~~Authority~~			~~(S) TE~~	~~1,1~~

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

INT 1 Reference: C 25; N 60.1-2

5.10.1   Ice areas (see S-4 – B-353.8 and B-449.1)

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

Remarks:
- **Ice Area** features that are located in the sea must be covered by a **Land Area** or **Unsurveyed Area** feature, if the depth of water beneath them is unknown, or covered by a **Depth Area** 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 **source date**.

5.10.1.1   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 **Ice Area** feature, with attribute **category of ice** = *5* (glacier) covered by a **Land Area** 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 **Coastline** feature, with attribute **category of coastline** = *6* (glacier (seaward end)).

Distinction: Depth area; land area.

5.11   Sloping ground

IHO Definition: **SLOPING GROUND**. An inclined surface. (Adapted from IHO Dictionary – S-32).
S-101 Geo Feature: Sloping ground (SLOGRD)
Primitives: Point, Surface

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Category of slope	(CATSLO)	1 : cutting 2 : embankment 3 : dune 4 : hill 6 : cliff 7 : scree	EN	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Nature of surface	(NATSUR)	1 : mud 2 : clay 3 : silt 4 : sand 5 : stone 6 : gravel 7 : pebbles 8 : cobbles 9 : rock 11 : lava 14 : coral 17 : shells 18 : boulder	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*

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

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

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

Remarks:

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

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

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

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

5.11.1.2   Cliffs (see S-4 – B-312.1)

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

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

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

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

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

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

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

Remarks:

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

<u>Distinction:</u> Land elevation; slope topline.

5.12 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 Edition 3.1, Appendix A – Chapter 1, Page 1.160, November 2000).	

S-101 Geo Feature: Slope topline (SLOTOP)

Primitives: Curve

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of slope	(CATSLO)	1 : cutting 2 : embankment 3 : dune 4 : hill 6 : cliff 7 : scree	EN	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Elevation	(ELEVAT)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Nature of surface	(NATSUR)	1 : mud 2 : clay 3 : silt 4 : sand 5 : stone 6 : gravel 7 : pebbles 8 : cobbles 9 : rock 11 : lava 14 : coral 17 : shells 18 : boulder	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Visually conspicuous	(CONVIS)		BO	0,1

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

INT 1 Reference: C 3; D 14, 15

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

5.12.1.1   Cliffs (see S-4 – B-312.1)

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

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

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

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

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

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

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

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

Distinction: Land elevation; sloping ground.

5.13   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).	
S-101 Geo Feature: Pingo (PINGOS)	
Primitives: Point, Surface	

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Exposition of sounding	(EXPSOU)	1 : within the range of depth of the surrounding depth area 2 : shoaler than the range of depth of the surrounding depth area 3 : deeper than the range of depth of the surrounding depth area	EN	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
Quality of sounding measurement	(QUASOU)	1 : depth known 2 : depth or least depth unknown 3 : doubtful sounding 4 : unreliable sounding 6 : least depth known 7 : least depth unknown, safe clearance at value shown 8 : value reported (not surveyed) 9 : value reported (not confirmed) 10 : maintained depth 11 : not regularly maintained	EN	0,*
Surface quality			C	0,* (ordered)
Nature of surface	(NATSUR)	1 : mud 2 : clay 3 : silt 4 : sand 5 : stone 6 : gravel 7 : pebbles 8 : cobbles 9 : rock 11 : lava	(S) EN	1,1

Comment [j10]: MD8 – 4.Co.11 and 4.Cl.9.

		14 : coral 17 : shells 18 : boulder		
Nature of surface – qualifying terms	(NATQUA)	1 : fine 2 : medium 3 : coarse 4 : broken 5 : sticky 6 : soft 7 : stiff 8 : volcanic 9 : calcareous 10 : hard	(S) EN	0,1
Surface layer			(S) IN	0,1
Technique of sounding measurement	(TECSOU)	1 : found by echo-sounder 2 : found by side scan sonar 3 : found by multi-beam 4 : found by diver 5 : found by lead-line 6 : swept by wire-drag 7 : found by laser 8 : swept by vertical acoustic system 9 : found by electromagnetic sensor 10 : photogrammetry 11 : satellite imagery 12 : found by leveling 13 : swept by side-scan sonar 14 : computer generated	EN	0,*
Reported date		ISO 8601:1988	DA	0,1
Radar conspicuous	(CONRAD)		BO	0,1
Value of sounding	(VALSOU)		RE	0,1
Vertical datum	(VERDAT)	1 : Mean low water springs 2 : Mean lower low water springs 3 : Mean sea level 4 : Lowest low water 5 : Mean low water 6 : Lowest low water springs 7 : Approximate mean low water springs 8 : Indian spring low water 9 : Low water springs 10 : Approximate lowest astronomical tide 11 : Nearly lowest low water 12 : Mean lower low water 13 : Low water 14 : Approximate mean low water 15 : Approximate mean lower low water 16 : Mean high water 17 : Mean high water springs 18 : High water 19 : Approximate mean sea level 20 : High water springs 21 : Mean higher high water 22 : Equinoctial spring low water 23 : Lowest astronomical	EN	0,1

Comment [A11]: Do not consider that this is needed for PINGOS.

		tide 24 : Local datum 25 : International great lakes datum 1985 26 : Mean water level 27 : Lower low water large tide 28 : Higher high water large tide 29 : Nearly highest high water 30 : Highest astronomical tide (HAT)		
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Water level effect	(WATLEV)	1 : partly submerged at high water 2 : always dry 3 : always under water / submerged 4 : covers and uncovers 5 : awash 6 : subject to inundation or flooding 7 : floating	EN	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference:

5.13.1 Pingo

If it is required to encode a pingo, either on land or in the water, it must be done using the feature **Pingo**.

Remarks:
- Where the seabed comprises a mixture of material, the complex attribute **surface quality** must be populated as multiple iterations, with the main constituent given first.

Distinction: Depth area; land area; landmark; sloping ground.

5.14   Tideway

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

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

S-101 Geo Feature: Tideway (TIDEWY)

Primitives: Curve, Surface

Real World	Paper Chart Symbol	ECDIS Symbol

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

INT 1 Reference:

5.14.1   Tideways (see S-4 – B-413.3)

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

Remarks:
• No remarks.

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

6 Cultural Features

6.1 Built-up area

<table>
<tr><td colspan="6">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).</td></tr>
<tr><td colspan="6"><u>S-101 Geo Feature:</u> Built-up area (BUAARE)</td></tr>
<tr><td colspan="6"><u>Primitives:</u> Point, Surface</td></tr>
<tr><td colspan="2"><i>Real World</i></td><td colspan="2"><i>Paper Chart Symbol</i></td><td colspan="2"><i>ECDIS Symbol</i></td></tr>
</table>

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of built-up area	(CATBUA)	1 : urban area 2 : settlement 3 : village 4 : town 5 : city 6 : holiday village	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,*
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
Radar conspicuous	(CONRAD)		BO	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
~~Recording date~~	~~(RECDAT)~~	~~ISO 8601:1988~~	~~DA~~	~~0,1~~
~~Recording indication~~	~~(RECIND)~~		~~TE~~	~~0,1~~
~~Source indication~~			~~C~~	~~0,*~~
~~Authority~~			~~(S) TE~~	~~1,1~~
~~Nationality~~			~~(S) TE~~	~~1,1~~

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

INT 1 Reference: D 1-4

6.1.1   Built-up areas (see S-4 – B-370.3-4 and B-370.6-7)

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 **Built-Up Area**.

Remarks:
- A built-up area crossed by curve 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 surface crossed by a river or canal of type surface 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 surface should not overlap a lake, dock or lock basin feature of type surface.
- 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 **Building** or **Built-Up Area**, and additionally, an **Administration Area (Named)** feature (see clause X.X) covering the whole named area should be created with the name encoded using the attribute **feature name**. The encoded **Administration Area (Named)** feature should also have the attribute **jurisdiction** = *3* (national sub-division).
- **Built-Up Area** must be covered by **Land Area** features of type surface, or be coincident with **Land Area** features of type point.

Distinction: Building single; landmark; railway; road.

> **Comment [j12]:** S-58 Check 56.

6.2 Building, single

IHO Definition: **BUILDING**. 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).
S-101 Geo Feature: Building (BUISGL)
Primitives: Point, Surface
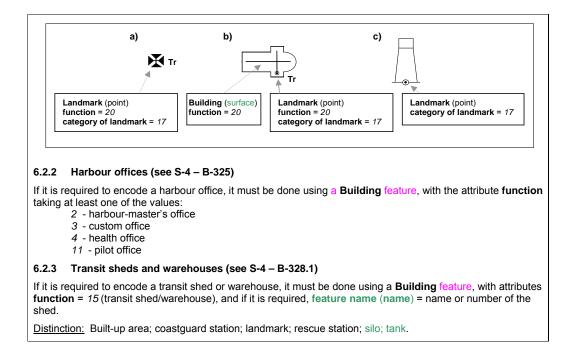
Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Building shape	(BUISHP)	5 : high-rise building 6 : pyramid 7 : cylindrical 8 : spherical 9 : cubic	EN	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Elevation	(ELEVAT)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Function	(FUNCTN)	2 : harbour-master's office 3 : custom office 4 : health office 5 : hospital 6 : post office 7 : hotel	EN	0,*

		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 : time ball 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 47 : boathouse		
Height	(HEIGHT)		RE	0,1
In the water			BO	0,1
Nature of construction	(NATCON)	1 : masonry 2 : concreted 4 : hard surfaced 5 : unsurfaced 6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted 11 : glass	EN	0,*
Status	(STATUS)	1 : permanent 4 : not in use 6 : reserved 7 : temporary 8 : private 12 : illuminated 13 : historic 14 : public 16 : watched 17 : un-watched 18 : existence doubtful	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1

Comment [j13]: S-57 Extension 06/01.

Comment [A14]: TSMAD21.

Vertical clearance fixed			C	0,1
Clearance value vertical	(VERCLR)		(S) RE	1,1
Vertical uncertainty	(VERACC)		(S) RE	0,1
Vertical datum	(VERDAT)	1 : Mean low water springs 2 : Mean lower low water springs 3 : Mean sea level 4 : Lowest low water 5 : Mean low water 6 : Lowest low water springs 7 : Approximate mean low water springs 8 : Indian spring low water 9 : Low water springs 10 : Approximate lowest astronomical tide 11 : Nearly lowest low water 12 : Mean lower low water 13 : Low water 14 : Approximate mean low water 15 : Approximate mean lower low water 16 : Mean high water 17 : Mean high water springs 18 : High water 19 : Approximate mean sea level 20 : High water springs 21 : Mean higher high water 22 : Equinoctial spring low water 23 : Lowest astronomical tide 24 : Local datum 25 : International great lakes datum 1985 26 : Mean water level 27 : Lower low water large tide 28 : Higher high water large tide 29 : Nearly highest high water 30 : Highest astronomical tide (HAT)	EN	0,1
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1

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

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

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

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

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

Scattered buildings of no individual importance must be omitted when more than about 1 mile (or 2 kilometres) inland. Nearer the shore they may be generalised by encoding a few representative buildings, sufficient to give the correct impression of building density.

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

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

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

Remarks:
- For landmarks, see clause X.X; for silos, tanks and water towers, see clause X.X. For common encoding combinations, see clause X.X.
- A ruined building should be encoded in the same way as the feature in good condition, but with attribute **condition** = *2* (ruined).
- For covered boathouses and other buildings that are located in or partially overlap the navigable water area, any associated features should be encoded as they exist in the "real world"; e.g. jetties as **Shoreline Construction**, pontoons as **Pontoon**, mooring posts as **Mooring/Warping Facility**. The roofed area may be covered by a **Building** feature of type surface, with attribute **function** = *47* (boathouse). If the service being provided by the structure is known, features **Small Craft Facility** (see clause X.X) or **Harbour Facility** (see clause X.X) may also be encoded.
- The complex attribute **vertical clearance fixed** must not be populated, unless the building is located over navigable water (i.e. attribute **in the water** set to *True*), e.g. for boathouses.
- When a building is shown as a surface, indicating its true shape, and it is required to encode a prominent feature such as a tower or spire that is part of the structure, two features must be created (see Figure below):
  - a **Building** feature of type surface for the main building,
  - a **Landmark** feature of type point for the prominent feature.

a)

Landmark (point)
function = *20*
category of landmark = *17*

b)

Building (surface)
function = *20*

Landmark (point)
function = *20*
category of landmark = *17*

c)

Landmark (point)
category of landmark = *17*

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

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

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

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

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

<u>Distinction:</u> 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).

S-101 Geo Feature: Airport/airfield (AIRARE)

Primitives: Point, Surface

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of airport/airfield	(CATAIR)	1 : military aeroplane airport 2 : civil aeroplane airport 3 : military heliport 4 : civil heliport 5 : glider airfield 6 : small planes airfield 8 : emergency airfield	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 12 : illuminated 14 : public 16 : watched 17 : un-watched	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1

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

INT 1 Reference: D 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 maximum display scale ENC data; they are significant to coastal navigation because of the many visual and aural features associated with them and the related air traffic.

For ENC data at larger maximum display scale s, an airport should be encoded using a combination of the following features: **Airport/Airfield** (surface), **Runway** (surface or curve), **Building** (surface or point) and **Landmark** (surface or point). At least one **Airport/Airfield** 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 at smaller maximum display scale s, an airport should be encoded as an **Airport/Airfield** of type point.

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 **Landmark** feature, with attributes **function** = *39* (control) and **category of landmark** = *17* (tower). If it is required to encode other buildings, this must be done using the feature **Building**.
- If it is required to encode a seaplane landing area, it must be done using the feature **Seaplane Landing Area** (see clause X.X).
- For navigational aids associated with air navigation, and air obstruction lights, see clauses related to navigational aids.

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).

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

S-101 Geo Feature: Runway (RUNWAY)

Primitives: Point, Curve, Surface

Real World	Paper Chart Symbol	ECDIS Symbol

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

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

INT 1 Reference: D 17

6.4.1   Airfields (see S-4 – B-366)

Airfields (or airports) within a few miles of the coast must be encoded on large and medium maximum display scale ENC data; they are significant to coastal navigation because of the many visual and aural features associated with them and the related air traffic.

For larger maximum display scale s ENC data, an airport should be encoded using a combination of the following features: **Airport/Airfield** (surface), **Runway** (surface or curve), **Building** (surface or point) and **Landmark** (surface or point). At least one **Airport/Airfield** 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).

Remarks:
- Two or more crossing runways may be encoded as one surface.
- If it is required to encode a seaplane landing area, it must be done using the feature **Seaplane Landing Area** (see clause X.X).
- For navigational aids associated with air navigation, and air obstruction lights, see clauses related to navigational aids.

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).
S-101 Geo Feature: Bridge (BRIDGE)
Primitives: Curve, Surface

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Category of bridge	(CATBRG)	1 : fixed bridge 2 : opening bridge 3 : swing bridge 4 : lifting bridge 5 : bascule bridge 6 : pontoon bridge 7 : draw bridge 8 : transporter bridge 9 : footbridge 10 : viaduct 11 : aqueduct 12 : suspension bridge	EN	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1

Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Height	(HEIGHT)		RE	0,1
Nature of construction	(NATCON)	1 : masonry 2 : concreted 4 : hard surfaced 5 : unsurfaced 6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted 10 : latticed	EN	0,*
Status	(STATUS)	1 : permanent 2 : occasional 5 : periodic/intermittent 7 : temporary 9 : mandatory 12 : illuminated 16 : watched 17 : un-watched	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

<u>INT 1 Reference:</u> D 20-24

6.5.1 Bridges (see S4 – B-381)

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

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

Remarks:

- Water under a bridge must be encoded using the features **Depth Area**, **Dredged Area** or **Unsurveyed Area** (and appropriate **Depth Contour** and **Sounding** features) if the waterway is navigable at the maximum display scale for the ENC data, or using the features **Land Area** or **Unsurveyed Area** if the waterway is not navigable at the maximum display scale for the ENC data.
- When there is a fixed vertical clearance, closed vertical clearance, or open vertical clearance given for a bridge, it should be applied only to the portion of the bridge to which it refers, using the feature **Span** (see clause X.X). All encoded bridge spans must be related to the **Bridge** feature through and association. See examples in the Figures below.
- The attribute **height** is used, where required, to encode the height of the highest point on the bridge structure (see clause X.X).
- In navigable water, bridge supports must be encoded, where possible, using a **Pylon/Bridge Support** feature (see clause X.X), with attribute **category of pylon** = *4* (bridge/pylon tower) or *5* (bridge pier).
- It is not mandatory to encode roads or railways on bridges.

6.5.2   Examples of Encoding Common Bridge Types

OPENING BRIDGE

Bridge
Category of bridge = *5* (bascule bridge)
Object name = *Tower Bridge*

Span
Category of span = *1* (fixed)

Consists of

Span
Category of span = *1* (fixed)

Pylon/Bridge support
Category of pylon = *4* (bridge pylon/tower)

Span
Category of span = *2* (opening)
Vertical clearance open
        Clearance value vertical = *42*
        Vertical uncertainty = *0.5*
Vertical clearance closed
        Clearance value vertical = *8*
        Vertical uncertainty = *0.5*
Vertical datum = *30* (HAT)

Distinction: Pipeline, overhead; pylon/bridge support.

6.6   Span

<u>IHO Definition:</u> **SPAN**. A section of a bridge between piers or supports.			
<u>**S-101 Geo Feature:**</u> **Span**			
<u>**Primitives:**</u> **Curve, Surface**			

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of span		1 : fixed 2 : opening	EN	0,1
Horizontal clearance fixed			C	0,1
Clearance value horizontal	(HORCLR)		(S) RE	1,1
Horizontal distance uncertainty	(HORACC)		(S) RE	0,1
Time range			C	0,*
Time end	(TIMEND)	ISO 8601:1988	(S) TI	1,1
Time start	(TIMSTA)	ISO 8601:1988	(S) TI	1,1
Vertical clearance closed			C	0,1
Clearance value vertical	(VERCCL)		(S) RE	1,1
Vertical uncertainty	(VERACC)		(S) RE	0,1
Vertical clearance fixed			C	0,1
Clearance value vertical	(VERCLR)		(S) RE	1,1
Vertical uncertainty	(VERACC)		(S) RE	0,1
Vertical clearance open			C	0,1
Clearance value vertical	(VERCOP)		(S) RE	1,1
Vertical uncertainty	(VERACC)		(S) RE	0,1
Vertical datum	(VERDAT)	3 : Mean sea level 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 24 : Local datum 25 : International great lakes datum 1985 26 : Mean water level 28 : Higher high water large tide 29 : Nearly highest high water 30 : Highest astronomical tide (HAT)	EN	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1

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

<u>INT 1 Reference:</u>

6.6.1   Span

If it is required to encode the clearance characteristics (vertical or horizontal), or whether fixed or opening, for any part of a bridge between piers or supports, it must be done using the feature **Span**, which must be associated to the **Bridge** feature. See clause X.X for examples of **Span** features used in conjunction with **Bridge** features,

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

<u>Remarks:</u>
- **Span** features should only be encoded <u>if the span is entirely or partly</u> over navigable water at the maximum display scale for the ENC data.
- Encoded **Span** features must be of the same geometric primitive (curve or surface) as the **Bridge** feature to which it is associated, and share the geometry of the portion of the **Bridge** to which the **Span** applies. The attribute **scale minimum** must also be populated with the same values as the **Bridge** feature to which it is associated. Where the maximum display scale of the ENC data is such that individual spans cannot be indicated, the entire bridge should be covered by a single **Span** feature, having attributes populated according to the most navigationally important span.
- For opening bridge spans the complex attributes **vertical clearance closed** and **vertical clearance open** must be encoded for both the opening (vertical open) and closed (vertical closed) clearance values. Where the open vertical clearance is unlimited, **vertical clearance open** must be populated with an empty (null) value.
- For fixed bridge spans the complex attribute **vertical clearance fixed** must be encoded for the fixed clearance value only.

<u>Distinction:</u> Conveyor; overhead cable; overhead pipeline.

6.7   Conveyor

IHO Definition: **CONVEYOR**. A mechanical device for conveying bulk material or people using an endless moving belt or series of rollers. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).	
S-101 Geo Feature: Conveyor (CONVYR)	
Primitives: Curve, Surface	

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of conveyor	(CATCON)	1 : aerial cableway (telepheric) 2 : belt conveyor 3 : flume	EN	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Height	(HEIGHT)		RE	0,1
Lifting capacity	(LIFCAP)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1

Comment [j15]: S-57 Extension 06/01.

Height	(HEIGHT)		RE	0,1
Product	(PRODCT)	4 : stone 5 : coal 6 : ore 7 : chemicals 10 : bauxite 11 : coke 12 : iron ingots 13 : salt 14 : sand 15 : timber 16 : sawdust/wood chips 17 : scrap metal 21 : cement 22 : grain	EN	0,1
Status	(STATUS)	1 : permanent 4 : not in use 6 : reserved 12 : illuminated 19 : buoyed	EN	0,*
Radar conspicuous	(CONRAD)		C	0,1
Vertical clearance fixed			C	0,1
Clearance value vertical	(VERCLR)		(S) RE	1,1
Vertical uncertainty	(VERACC)		(S) RE	0,1
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Vertical datum	(VERDAT)	1 : Mean low water springs 2 : Mean lower low water springs 3 : Mean sea level 4 : Lowest low water 5 : Mean low water 6 : Lowest low water springs 7 : Approximate mean low water springs 8 : Indian spring low water 9 : Low water springs 10 : Approximate lowest astronomical tide 11 : Nearly lowest low water 12 : Mean lower low water 13 : Low water 14 : Approximate mean low water 15 : Approximate mean lower low water 16 : Mean high water 17 : Mean high water springs 18 : High water 19 : Approximate mean sea level 20 : High water springs 21 : Mean higher high water 22 : Equinoctial spring low water 23 : Lowest astronomical tide 24 : Local datum 25 : International great lakes datum 1985 26 : Mean water level 27 : Lower low water large	EN	0,1

Comment [j16]: S-57 Extension 06/01.

		tide			
		28 : Higher high water large tide			
		29 : Nearly highest high water			
		30 : Highest astronomical tide (HAT)			
Information			C	0,*	
Language		ISO 639-3	(S) TE	0,1	
Text	(INFORM)		(S) TE	1,1	
Pictorial representation	(PICREP)		TE	0,1	
Textual description			C	0,*	
File reference	(TXTDSC)		(S) TE	1,1	
Language		ISO 639-3	(S) TE	0,1	
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1	
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1	
Recording indication	(RECIND)		TE	0,1	
Source indication			C	0,*	
Authority			(S) TE	1,1	
Nationality			(S) TE	1,1	
ID code			(S) TE	0,1	
Source			(S) TE	0,1	
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1	

<u>INT 1 Reference:</u> D 25

6.7.1   Conveyors (see S-4 – B-382.3)

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

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

<u>Remarks:</u>
- In navigable water, conveyor supports must be encoded, where possible, using a **Pylon/Bridge Support** feature (see clause X.X), with attribute **category of pylon** = *3* (aerial cableway/sky pylon).

<u>Distinction:</u> Cable, overhead; pylon/bridge support.

6.8 Overhead cables

IHO Definition: **CABLE, OVERHEAD**. A single continuous rope-like bundle consisting of multiple strands of fiber, plastic, metal, and/or glass, which is supported by structures such as poles or pylons and passing over or nearby navigable waters. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2012).

S-101 Geo Feature: Cable overhead (CBLOHD)

Primitives: Curve

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of cable	(CATCBL)	1 : power line 3 : transmission line 4 : telephone 5 : telegraph	EN	0,1
Condition	(CONDTN)	1 : under construction 5 : planned construction	EN	0,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Ice factor	(ICEFAC)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Status	(STATUS)	1 : permanent 4 : not in use 5 : periodic/intermittent 7 : temporary 12 : illuminated 19 : buoyed	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Vertical clearance fixed			C	0,1
Clearance value vertical	(VERCLR)		(S) RE	1,1
Vertical uncertainty	(VERACC)		(S) RE	0,1
Vertical clearance safe			C	0,1
Clearance value vertical	(VERCSA)		(S) RE	1,1
Vertical uncertainty	(VERACC)		(S) RE	0,1
Vertical datum	(VERDAT)	1 : Mean low water springs 2 : Mean lower low water springs 3 : Mean sea level 4 : Lowest low water	EN	0,1

Comment [j17]: S-57 Extension 06/01.

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

INT 1 Reference: D 26, 27

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

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

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

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

Remarks:
- If it is required to encode telepheric cables, this must be done using **Conveyor** features (see clause X.X), with attribute CATCON = *1* (aerial cableway (telepheric)).
- Where a cable has radar reflectors at known positions, they must be encoded as separate **Radar Reflector** features (see clause X.X). If the whole cable is radar conspicuous, the maximum display scale for the ENC data is too small to show individual reflectors, or the positions of the radar reflectors are not known, the **Cable Overhead** should be encoded with attribute **radar conspicuous**.
- In navigable water, overhead cable supports must be encoded, where possible, using a **Pylon/Bridge Support** feature (see clause X.X), with attribute **category of pylon** = *1* or *2*.

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

6.9 Pipeline, overhead

IHO Definition: **PIPELINE**. A string of interconnected pipes used for the transport of matter, nowadays mainly oil or gas. (IHO Dictionary – S-32).
An overhead pipeline is a pipeline supported by pylons and passing over or nearby navigable waters. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.119, November 2000).

S-101 Geo Feature: Pipeline overhead (PIPOHD)

Primitives: Curve

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of pipeline/pipe	(CATPIP)	2 : outfall pipe 3 : intake pipe 4 : sewer 6 : supply pipe	EN	0,1
Condition	(CONDTN)	1 : under construction 5 : planned construction	EN	0,1
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Product	(PRODCT)	1 : oil 2 : gas 3 : water 7 : chemicals 8 : drinking water 9 : milk 18 : liquefied natural gas (LNG) 19 : liquefied petroleum gas (LPG) 20 : wine 22 : grain	EN	0,1
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 4 : not in use 7 : temporary 12 : illuminated	EN	0,*
Vertical clearance fixed			C	0,1
Clearance value vertical	(VERCLR)		(S) RE	1,1
Vertical uncertainty	(VERACC)		(S) RE	0,1

Vertical datum	(VERDAT)	1 : Mean low water springs 2 : Mean lower low water springs 3 : Mean sea level 4 : Lowest low water 5 : Mean low water 6 : Lowest low water springs 7 : Approximate mean low water springs 8 : Indian spring low water 9 : Low water springs 10 : Approximate lowest astronomical tide 11 : Nearly lowest low water 12 : Mean lower low water 13 : Low water 14 : Approximate mean low water 15 : Approximate mean lower low water 16 : Mean high water 17 : Mean high water springs 18 : High water 19 : Approximate mean sea level 20 : High water springs 21 : Mean higher high water 22 : Equinoctial spring low water 23 : Lowest astronomical tide 24 : Local datum 25 : International great lakes datum 1985 26 : Mean water level 27 : Lower low water large tide 28 : Higher high water large tide 29 : Nearly highest high water 30 : Highest astronomical tide (HAT)	EN	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1

~~Source date~~	~~(SORDAT)~~	~~ISO 8601:1988~~	~~(S) DA~~	~~1,1~~

INT 1 Reference: D 28

6.9.1   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 **Pipeline Overhead**.

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

Remarks:
- Where an overhead pipeline is disused, it should be encoded with the attribute **status** = *4* (not in use), and the attributes **category of pipe** and **product** must not be encoded.
- Where a pipeline has radar reflectors at known positions, they must be encoded as separate **Radar Reflector** features (see clause X.X). If the whole pipeline is radar conspicuous, the maximum display scale for the ENC data is too small to show individual reflectors, or the positions of the radar reflectors are not known, the **Pipeline Overhead** should be encoded with attribute **radar conspicuous**.

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

6.10   Pylon/bridge support

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

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

Primitives: Point, Surface

Real World	Paper Chart Symbol	ECDIS Symbol

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

Height	(HEIGHT)			RE	0,1
Nature of construction	(NATCON)	1 : masonry 2 : concreted 6 : wooden 7 : metal 9 : painted 10 : latticed		EN	0,*
Radar conspicuous	(CONRAD)			BO	0,1
Status	(STATUS)	4 : not in use 12 : illuminated 14 : public		EN	0,*
Vertical length	(VERLEN)			RE	0,1
Visually conspicuous	(CONVIS)			BO	0,1
Water level effect	(WATLEV)	1 : partly submerged at high water 2 : always dry 3 : always under water / submerged 4 : covers and uncovers 5 : awash 6 : subject to inundation or flooding		EN	0,1
Information				C	0,*
Language		ISO 639-3		(S) TE	0,1
Text	(INFORM)			(S) TE	1,1
Pictorial representation	(PICREP)			TE	0,1
Textual description				C	0,*
File reference	(TXTDSC)			(S) TE	1,1
Language		ISO 639-3		(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X		IN	0,1
Recording date	(RECDAT)	ISO 8601:1988		DA	0,1
Recording indication	(RECIND)			TE	0,1
Source indication				C	0,*
Authority				(S) TE	1,1
Nationality				(S) TE	1,1
ID code				(S) TE	0,1
Source				(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988		(S) DA	1,1

INT 1 Reference: D 26

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

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

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

Distinction: Landmark.

6.11   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).

S-101 Geo Feature: Fence/wall (FNCLNE)

Primitives: Curve

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of fence	(CATFNC)	1 : fence 3 : hedge 4 : wall	EN	0,*
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Elevation	(ELEVAT)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
Nature of construction	(NATCON)	1 : masonry 2 : concreted 3 : loose boulders 6 : wooden 7 : metal 9 : painted	EN	0,*

		10 : latticed			
Radar conspicuous	(CONRAD)		BO	0,1	
Status	(STATUS)	1 : permanent 7 : temporary 12 : illuminated 13 : historic	EN	0,*	
Vertical length	(VERLEN)		RE	0,1	
Visually conspicuous	(CONVIS)		BO	0,1	
Information			C	0,*	
Language		ISO 639-3	(S) TE	0,1	
Text	(INFORM)		(S) TE	1,1	
Textual description			C	0,*	
File reference	(TXTDSC)		(S) TE	1,1	
Language		ISO 639-3	(S) TE	0,1	
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1	
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1	
Recording indication	(RECIND)		TE	0,1	
Source indication			C	0,*	
Authority			(S) TE	1,1	
Nationality			(S) TE	1,1	
ID code			(S) TE	0,1	
Source			(S) TE	0,1	
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1	

INT 1 Reference:

6.11.1 Fences and walls

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

Remarks:
- No remarks.

Distinction:

6.12   Railway

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

S-101 Geo Feature: Railway (RAILWY)

Primitives: Curve

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

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

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

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

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

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

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

Distinction: Road; tunnel.

6.13   Road

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

Comment [j19]: S-57 Extension 06/01.

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

INT 1 Reference: D 7, 10-12

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

On the largest maximum display scale continuous coastal series of ENCs, and larger maximum display scale ENC data, all roads and tracks running down to the coastline should be encoded where the maximum display scale permits. Particular attention must be given to local roads serving minor piers, boat hards and landings. Inland, major roads within a few miles of the coast should be encoded to give a general indication of the degree of development, but tracks and all or some of the minor roads should be omitted. In largely undeveloped areas, with very few roads, it may be desirable to encode even minor roads inland.

On smaller maximum 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 **Road**.

Remarks:
- ~~Road crossings (attribute CATROD = 7) should not be encoded.~~
- No remarks

Distinction: Causeway; railway.

6.14   Tunnel

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

S-101 Geo Feature: Tunnel (TUNNEL)

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

Real World	*Paper Chart Symbol*	*ECDIS Symbol*	

S-101 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Horizontal clearance fixed			C	0,1
Clearance value horizontal	(HORCLR)		(S) RE	1,1
Horizontal distance uncertainty	(HORACC)		(S) RE	0,1
Status	(STATUS)	1 : permanent 3 : recommended 4 : not in use 6 : reserved 8 : private 14 : public ~~16 : watched~~ ~~17 : un-watched~~	EN	0,*
Vertical clearance fixed			C	0,1
Clearance value vertical	(VERCLR)		(S) RE	1,1
Vertical uncertainty	(VERACC)		(S) RE	0,1
Vertical datum	(VERDAT)	~~1 : Mean low water springs~~ ~~2 : Mean lower low water springs~~ 3 : Mean sea level ~~4 : Lowest low water~~ ~~5 : Mean low water~~ ~~6 : Lowest low water springs~~ ~~7 : Approximate mean low water springs~~ ~~8 : Indian spring low water~~ ~~9 : Low water springs~~ ~~10 : Approximate lowest astronomical tide~~ ~~11 : Nearly lowest low water~~ ~~12 : Mean lower low water~~	EN	0,1

		13 : Low water		
		14 : Approximate mean low water		
		15 : Approximate mean lower low water		
		16 : Mean high water		
		17 : Mean high water springs		
		18 : High water		
		19 : Approximate mean sea level		
		20 : High water springs		
		21 : Mean higher high water		
		22 : Equinoctial spring low water		
		23 : Lowest astronomical tide		
		24 : Local datum		
		25 : International great lakes datum 1985		
		26 : Mean water level		
		27 : Lower low water large tide		
		28 : Higher high water large tide		
		29 : Nearly highest high water		
		30 : Highest astronomical tide (HAT)		
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: D 16

6.14.1 Tunnels (see S-4 – B-363.1)

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

Remarks:
- If there is a waterway inside the tunnel, and the waterway is navigable at the maximum display scale for the ENC data, it must be encoded as if it were a navigable canal (see clause X.X), using the features **Depth Area** or **Dredged Area** in conjunction with the **Tunnel** feature.   There must be no **Land Area** feature in the area covering the waterway.
- If it is required to encode a waterway inside a tunnel that is not navigable at the maximum display scale for the ENC data, it must be done using the feature **Canal** (see clause X.X) in conjunction with the **Tunnel** feature. A **Land Area** feature must cover the tunnel. The complex attributes **horizontal clearance fixed**

and **vertical clearance fixed** must not be encoded on the **Tunnel** feature in this case.
- If it is required to encode a tunnel that has no waterway inside it (but a railway, road etc), only the **Tunnel** feature must be encoded (the section of railway or road inside the tunnel must not be encoded), covered by **Land Area**, **Depth Area**, **Dredged Area** or **Unsurveyed Area** features as appropriate.

Distinction: Railway; road.

7   Landmarks

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

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

Feature	INT1	Feature class	function	category of landmark	building shape	product	category of silo/tank
Administrative		**Building**	18	/		/	/
Bank office		**Building**	13	/		/	/
Buddhist temple	E16	**Building**	25	/		/	/
Bus station		**Building**	42	/		/	/
Cairn	Q100	**Landmark**	/	1	/	/	/
Cemetery	E19	**Landmark**		2	/	/	/
Chapel	E11	**Building**	21	/		/	/
Chimney	E22	**Landmark**		3		/	
Church	E10.1	**Building**	20	/		/	/
Church dome, Cupola	E10.4	**Landmark**	20	15	/	/	/
Church spire	E10.3	**Landmark**	20	20	/	/	/
Church tower	E10.2	**Landmark**	20	17	/	/	/
Clock tower		**Landmark**	38	17	/	/	/
Column	E24	**Landmark**	/	10	/	/	/
Communication mast		**Landmark**	29	7	/	/	/
Communication tower		**Landmark**	29	17	/	/	/
Control tower		**Landmark**	39	17	/	/	/
Cooling tower		**Landmark**	35	17	/	/	/
Cross, Calvary	E12	**Landmark**		14	/	/	/
Custom office	F61	**Building**	3	/		/	/
Dish aerial	E31	**Landmark**		4	/	/	/
Dome or cupola, part of a building		**Landmark**		15	/	/	/
Educational facility		**Building**	19	/		/	/
Factory		**Building**	16	/		/	/
Flagstaff, Flagpole	E27	**Landmark**		5	/	/	/
Flare stack	E23	**Landmark**		6	/	/	/
Grain elevator		**Silo/Tank**	/	/		22	3
Harbour-master's office	F60	**Building**	2	/		/	/
Headquarters for district control		**Building**	14	/		/	/
Health office	F62.1	**Building**	4	/		/	/
Hospital	F62.2	**Building**	5	/		/	/
Hotel	D6	**Building**	7	/		/	/
House, Building	D5	**Building**		/		/	/
Large rock (or boulder) on land		**Landmark**	/	21	/	/	/
Light house (tower)	P1	**Landmark**	33	17	/	/	/

Feature	INT1	Feature class	function	category of landmark	building shape	product	category of silo/tank
Light house (other shapes)	P1	**Building**	33	/		/	/
Lookout station in general		**Building**	28	/		/	/
Lookout tower		**Landmark**	28	17	/	/	/
Marabout	E18	**Building**	27	/		/	/
Mast in general		**Landmark**		7	/	/	/
Memorial plaque		**Landmark**		11	/	/	/
Microwave tower		**Landmark**	34	17	/	/	/
Minaret	E17	**Landmark**	26	20	/	/	/
Monument	E24	**Landmark**		9	/	/	/
Mooring mast		**Landmark**	40	7	/	/	/
Mosque	E17	**Building**	26	/		/	/
Obelisk	E24	**Landmark**	/	12	/	/	/
Observation tower		**Landmark**	36	17	/	/	/
Pagoda	E14	**Building**	23	/		/	/
Pilot lookout	T2	**Building**	12	/		/	/
Pilot office	T3	**Building**	11	/		/	/
Police station		**Building**	9	/		/	/
Post office	F63	**Building**	6	/		/	/
Power station		**Building**	17	/		/	/
Radar dome	E30.4	**Landmark**	32	15	/	/	/
Radar mast	E30.1	**Landmark**	32	7	/	/	/
Radar scanner	E30.3	**Landmark**		16	/	/	/
Radar tower	E30.2	**Landmark**	32	17	/	/	/
Radio mast	E28	**Landmark**	31	7	/	/	/
Radio tower	E29	**Landmark**	31	17	/	/	/
Railway station	D13	**Building**	8	/		/	/
Shinto shrine	E15	**Building**	24	/		/	/
Silo	E33	**Silo/Tank**	/	/			1
Spire, part of a building		**Landmark**		20	/	/	/
Stadium		**Building**	41	/		/	/
Statue	E24	**Landmark**		13	/	/	/
Tank	E32	**Silo/Tank**	/	/			2
Television mast	E28	**Landmark**	30	7	/	/	/
Television tower	E29	**Landmark**	30	17	/	/	/
Temple	E13	**Building**	22	/		/	/
Timeball tower		**Landmark**	37	17	/	/	/
Tower	E20	**Landmark**		17	/	/	/
Tower, part of a building		**Landmark**		17	/	/	/
Transit shed, Warehouse	F51	**Building**	15	/		/	/
Water tower	E21	**Silo/Tank**	/	/	/	3 or 8	4
Water-police station		**Building**	10	/		/	/
Windmill	E25	**Landmark**		18	/	/	/
Windmotor	E26.1	**Landmark**		19	/	/	/

7.2   Landmark

IHO Definition: **LANDMARK**. Any prominent object on land which can be used in determining a location or a direction. (IHO Dictionary – S-32).
S-101 Geo Feature: Landmark (LNDMRK)
Primitives: Point, Curve, Surface

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Category of landmark	(CATLMK)	1 : cairn 2 : cemetery 3 : chimney 4 : dish aerial 5 : flagstaff (flagpole) 6 : flare stack 7 : mast 8 : windsock 9 : monument 10 : column (pillar) 11 : memorial plaque 12 : obelisk 13 : statue 14 : cross 15 : dome 16 : radar scanner 17 : tower 18 : windmill 19 : windmotor 20 : spire/minaret 21 : large rock (or boulder) on land 22 : triangulation mark 23 : boundary mark 24 : observation wheel	EN	1,*
Category of special purpose mark	(CATSPM)	1 : firing danger area mark 2 : target mark 3 : marker ship mark 4 : degaussing range mark 5 : barge mark 6 : cable mark 7 : spoil ground mark 8 : outfall mark 9 : ODAS (Ocean Data Acquisition System) 10 : recording mark 11 : seaplane anchorage mark 12 : recreation zone mark 14 : mooring mark 15 : LANBY (Large Automatic Navigational Buoy) 16 : leading mark 17 : measured distance mark 18 : notice mark 19 : TSS mark (Traffic Separation Scheme) 20 : anchoring prohibited mark	EN	0,*

Comment [A20]: Taken from CATCTR

Comment [j21]: MD8 – 7.Co.10.

		21 : berthing prohibited mark 22 : overtaking prohibited mark 23 : two-way traffic prohibited mark 24 : reduced wake mark 25 : speed limit mark 26 : stop mark 27 : general warning mark 28 : sound ship's siren mark 29 : restricted vertical clearance mark 30 : maximum vessel's draught mark 31 : restricted horizontal clearance mark 32 : strong current warning mark 33 : berthing permitted mark 34 : overhead power cable mark 35 : channel edge gradient' mark 36 : telephone mark 37 : ferry crossing mark 39 : pipeline mark 40 : anchorage mark 41 : clearing mark 42 : control mark 43 : diving mark 44 : refuge beacon 45 : foul ground mark 46 : yachting mark 47 : heliport mark 48 : GNSS mark 49 : seaplane landing mark 50 : control mark 51 : work in progress mark 52 : mark with unknown purpose 53 : wellhead mark 54 : channel separation mark 55 : marine farm mark 56 : artificial reef mark 57 : ice mark 58 : nature reserve mark		
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1

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

Condition	(CONDTN)	1 : under construction 2 : ruined 4 : wingless 5 : planned construction	EN	0,1
Elevation	(ELEVAT)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Function	(FUNCTN)	2 : harbour-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 : time ball 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 47 : boathouse	EN	0,*
Height	(HEIGHT)		RE	0,1
In the water			BO	0,1

Comment [A23]: TSMAD21.

Nature of construction	(NATCON)	1 : masonry 2 : concreted 3 : loose boulders 6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted 10 : latticed	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 12 : illuminated 13 : historic 14 : public 16 : watched 17 : un-watched	EN	0,*
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

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

7.2.1   Buildings, landmarks, tanks, silos (see S-4 – B-373; B-373.6; B-374.3-7; B-375.1-2; B-456.2; B-487.3)
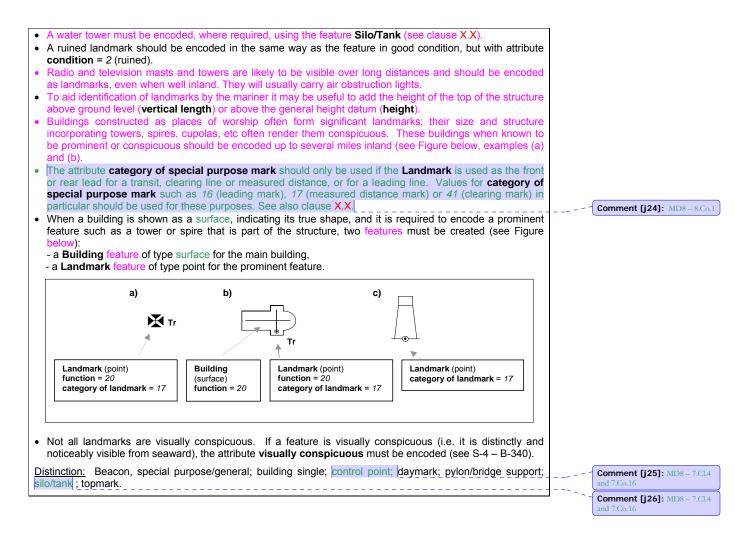
Depending on height and the topographic relief, structures considered to be landmarks should be encoded up to several miles/kilometres inland.

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

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

<u>Remarks:</u>
- For buildings, see clause X.X; for silos, tanks and water towers, see clause X.X. For common encoding combinations, see clause X.X. For structures such as offshore wind turbines, see clause X.X.

- A water tower must be encoded, where required, using the feature **Silo/Tank** (see clause X.X).
- A ruined landmark should be encoded in the same way as the feature in good condition, but with attribute **condition** = *2* (ruined).
- Radio and television masts and towers are likely to be visible over long distances and should be encoded as landmarks, even when well inland. They will usually carry air obstruction lights.
- To aid identification of landmarks by the mariner it may be useful to add the height of the top of the structure above ground level (**vertical length**) or above the general height datum (**height**).
- Buildings constructed as places of worship often form significant landmarks; their size and structure incorporating towers, spires, cupolas, etc often render them conspicuous. These buildings when known to be prominent or conspicuous should be encoded up to several miles inland (see Figure below, examples (a) and (b).
- The attribute **category of special purpose mark** should only be used if the **Landmark** is used as the front or rear lead for a transit, clearing line or measured distance, or for a leading line. Values for **category of special purpose mark** such as *16* (leading mark), *17* (measured distance mark) or *41* (clearing mark) in particular should be used for these purposes. See also clause X.X.
- When a building is shown as a surface, indicating its true shape, and it is required to encode a prominent feature such as a tower or spire that is part of the structure, two features must be created (see Figure below):
  - a **Building** feature of type surface for the main building,
  - a **Landmark** feature of type point for the prominent feature.

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

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

7.3   Silo/tank

IHO Definition: **SILO/TANK**. A silo is a large storage structure used for storing loose materials. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2012). A tank is a container used for the storage of liquids and/or gases. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2012).	

S-101 Geo Feature: Silo/tank (SILTNK)

Primitives: Point, Surface

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Building shape	(BUISHP)	5 : high-rise building 6 : pyramid 7 : cylindrical 8 : spherical 9 : cubic	EN	0,1
Category of silo/tank	(CATSIL)	1: silo in general 2: tank in general 3: grain elevator 4: water tower	EN	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Elevation	(ELEVAT)		RE	0,1
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1

Height	(HEIGHT)		RE	0,1
In the water			BO	0,1
Nature of construction	(NATCON)	1 : masonry 2 : concreted 6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted	EN	0,*

Product	(PRODCT)	1 : oil
		2 : gas
		3 : water
		7 : chemicals
		8 : drinking water
		9 : milk
		14 : sand
		18 : liquefied natural gas
		    (LNG)
		19 : liquefied petroleum gas
		    (LPG)
		20 : wine
		21 : cement
		22 : grain
			EN	0,*

Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 4 : not in use 12 : illuminated 13 : historic	EN	0,*
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

<u>INT 1 Reference</u>: E 2, 32-33

7.3.1   Tanks, silos (see S-4 – B-340.2 and B-376)

Isolated tanks or gasholders may be good landmarks and should be represented true to scale (i.e. as surface) where possible, to enable them to be used as fixing marks. Groups of tanks, as at a refinery, may be useful for general identification of position but cannot usually be used for precise position-fixing because of uncertainty of the location of individual tanks.

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

Remarks:
- For buildings, see clause X.X; for landmarks, see clause X.X. For common encoding combinations, see clause X.X.
- Groups of tanks in close proximity (tank farm) must be encoded, where required, using the feature **Production/Storage Area** (see cluse X.X). Individual, visually conspicuous tanks within a tank farm may be encoded as **Silo/Tank** within the **Production/Storage Area**.

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

7.4   Fortified structure

IHO Definition: **FORTIFIED STRUCTURE**. A structure that is specifically designed or reinforced to provide for defence from armed attack. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).
S-101 Geo Feature: Fortified structure (FORSTC)
Primitives: Point, Curve, Surface

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of fortified structure	(CATFOR)	1 : castle 2 : fort 3 : battery 4 : blockhouse 5 : fortified tower 6 : redoubt 8 : fortified submarine shelter	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined	EN	0,1
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
In the water			BO	0,1
Nature of construction	(NATCON)	1 : masonry 2 : concreted 3 : loose boulders 6 : wooden 7 : metal 9 : painted	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 4 : not in use 7 : temporary 8 : private 12 : illuminated 13 : historic 14 : public 19 : buoyed	EN	0,*
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1

Comment [j27]: MD8 – 7.Co.1

Comment [j28]: Extension 6/01

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

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

INT 1 Reference: E 34.1-3

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

Some coastlines have prominent defensive structures, often disused, decayed, or used for non-defence purposes. Such structures range from major castles and forts to minor lookout posts and may be the main distinctive features of headlands or stretches of coastline. National regulations permitting, any such features as are likely to be visible from seaward and should be encoded on the largest maximum display scale ENC data.

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

Remarks:
• No remarks.

Distinction: Building, single; landmark.

7.5   Production/storage area

IHO Definition: **PRODUCTION/STORAGE AREA**. An area on land for the exploitation or storage of natural resources. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.124, November 2000).
S-101 Geo Feature: Production/storage area (PRDARE)
Primitives: Point, Surface

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Category of production area	(CATPRA)	1 : quarry 2 : mine 3 : stockpile 4 : power station area 5 : refinery area 6 : timber yard 7 : factory area 8 : tank farm 9 : wind farm 10: slag heap/spoil heap	EN	1,1
Condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
Elevation	(ELEVAT)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Height	(HEIGHT)		RE	0,1
Product	(PRODCT)	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	EN	0,*

		17 : scrap metal 18 : liquefied natural gas (LNG) 19 : liquefied petroleum gas (LPG) 20 : wine 21 : cement 22 : grain 23 : electricity		
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 4 : not in use 8 : private 12 : illuminated ~~19 : buoyed~~	EN	0,*
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
~~Recording date~~	~~(RECDAT)~~	~~ISO 8601:1988~~	~~DA~~	~~0,1~~
~~Recording indication~~	~~(RECIND)~~		~~TE~~	~~0,1~~
~~Source indication~~			~~C~~	~~0,*~~
~~Authority~~			~~(S) TE~~	~~1,1~~
~~Nationality~~			~~(S) TE~~	~~1,1~~
~~ID code~~			~~(S) TE~~	~~0,1~~
~~Source~~			~~(S) TE~~	~~0,1~~
~~Source date~~	~~(SORDAT)~~	~~ISO 8601:1988~~	~~(S) DA~~	~~1,1~~

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

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

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

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

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

Distinction: Free port area; offshore production area.

8   Ports

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

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

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

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

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

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

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

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

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

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

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

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

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

8.2   Checkpoint

IHO Definition: **CHECKPOINT**. An official location at which to register, declare and/or inspect goods and/or people. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

S-101 Geo Feature: Checkpoint (CHKPNT)

Primitives: Point, Surface

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Category of checkpoint	(CATCHP)	1 : custom	EN	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Status	(STATUS)	1 : permanent 2 : occasional 5 : periodic/intermittent 7 : temporary 9 : mandatory 12 : illuminated 16 : watched 17 : un-watched	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
INT 1 Reference: **8.2.1 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 **Checkpoint**.

Remarks:
- The **Checkpoint** must only be used to encode the function. In addition, if it is required to encode a physical feature (e.g. building, fence, gate), it must be done using an appropriate feature (e.g. **Building**, **Landmark**).

Distinction: Custom zone.

8.3   Hulks

<table>
<tr><td colspan="5">IHO Definition: HULK. Usually refers to an unrigged hull of a wrecked or condemned ship. (IHO Dictionary – S-32).</td></tr>
<tr><td colspan="5"><u>S-101 Geo Feature:</u> Hulk (HULKES)</td></tr>
<tr><td colspan="5"><u>Primitives:</u> Point, Surface</td></tr>
<tr><td colspan="2"><i>Real World</i></td><td colspan="2"><i>Paper Chart Symbol</i></td><td><i>ECDIS Symbol</i></td></tr>
</table>

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of hulk	(CATHLK)	1 : floating restaurant 2 : historic ship 3 : floating museum 4 : floating accommodation 5 : floating breakwater 6 : casino 7 : training vessel	EN	0,*
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Horizontal length	(HORLEN)		RE	0,1
Horizontal width	(HORWID)		RE	0,1
Radar conspicuous	(CONRAD)		BO	0,1
Vertical length	(VERLEN)		RE	0,1

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

INT 1 Reference: F 34

8.3.1   Hulks (see S-4 – B-330)

If it is required to encode a permanently moored ship, it must be done using the feature **Hulk**.

Remarks:
- A **Hulk** feature of type surface must not be bound by curve features **Coastline** or **Shoreline Construction**, unless the edge associated with the curve feature is also the boundary of a **Land Area** feature of type surface.
- If it is required to encode a floating production, storage and off-loading vessel, it must be done using the feature **Offshore Platform** (see clause X.X), with attribute **category of offshore platform** = _8_ (floating production, storage and off-loading vessel (FPSO)).
- If it is required to encode a floating breakwater, it must be done using the feature **Shoreline Construction** (see clause X.X), with attributes **category of shoreline construction** = _1_ (breakwater) and **water level effect** = _7_ (floating).

Distinction: Offshore platform; shoreline construction; wreck.

8.4 Piles

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

S-101 Geo Feature: Pile (PILPNT)

Primitives: Point, Curve, Surface

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Category of pile	(CATPLE)	1 : stake 3 : post 4 : tripodal 5 : piling 6 : area of piles 7 : pipe	EN	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Height	(HEIGHT)		RE	0,1

Comment [A32]: S-57 Extension 6/01.

Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 4 : not in use 6 : reserved 7 : temporary 8 : private 12 : illuminated 14 : public	EN	0,*
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

8.4.1   Piles (see S-4 – B-327.3)

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

Remarks:
- Stumps of piles or posts that are dangerous to navigation must be encoded, where required, using **Obstruction** features (see clause X.X), with attribute **category of obstruction** = *1* (snag/stump), and must not be encoded using **Pile**.
- The value **category of pile** = *5* (piling), sometimes termed "row of piles" or "sheet piling", should only be used for **Pile** of type curve. Point primitive may be used for smaller maximum display scale ENC data.
- Stakes and posts that are identified on the source to serve the purpose of aids to navigation must be encoded, where required, using the appropriate beacon feature (e.g. **Beacon Special Purpose/General**), with attribute **beacon shape** = *1* (stake, pole, perch, post).
- See clause X.X for details of how to encode a pile or post that is used as a mooring/warping facility.

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

Comment [A33]: S-57 Extension 6/01.

8.5   Dyke

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

S-101 Geo Feature: Dyke (DYKCON)

Primitives: Curve, Surface

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Height	(HEIGHT)		RE	0,1
Nature of construction	(NATCON)	1 : masonry 2 : concreted 3 : loose boulders 4 : hard surfaced 5 : unsurfaced 6 : wooden 7 : metal 9 : painted	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
~~Recording date~~	~~(RECDAT)~~		~~DA~~	~~0,1~~
~~Recording indication~~	~~(RECIND)~~	~~ISO 8601:1988~~	~~TE~~	~~0,1~~
~~Source indication~~			~~C~~	~~0,*~~
~~Authority~~			~~(S) TE~~	~~1,1~~
~~Nationality~~			~~(S) TE~~	~~1,1~~
~~ID code~~			~~(S) TE~~	~~0,1~~
~~Source~~			~~(S) TE~~	~~0,1~~
~~Source date~~	~~(SORDAT)~~	~~ISO 8601:1988~~	~~(S) DA~~	~~1,1~~

INT 1 Reference: F 1

8.5.1   Dykes (see S-4 – B-313.1)

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

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

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

Distinction: Dam; sloping ground; slope topline.

8.6   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. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.154, November 2000, as amended).

Comment [j34]: MD8 – 3.Cl.4 and 3.Co.3

S-101 Geo Feature: Shoreline construction (SLCONS)

Primitives: Point, Curve, Surface

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of shoreline construction	(CATSLC)	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	EN	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name	(S) EN	0,1

Comment [j35]: Extension 6/01.

		~~5 : display name~~		
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Height	(HEIGHT)		RE	0,1
Horizontal clearance fixed			C	0,1
Clearance value horizontal	(HORCLR)		(S) RE	1,1
Horizontal distance uncertainty	(HORACC)		(S) RE	0,1
Horizontal length	(HORLEN)		RE	0,1
Horizontal width	(HORWID)		RE	0,1
Nature of construction	(NATCON)	1 : masonry 2 : concreted 3 : loose boulders 4 : hard surfaced 5 : unsurfaced 6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted 10 : latticed	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 3 : recommended 4 : not in use 6 : reserved 7 : temporary 8 : private 12 : illuminated 13 : historic 14 : public 19 : buoyed	EN	0,*
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Water level effect	(WATLEV)	1 : partly submerged at high water 2 : always dry 3 : always under water / submerged 4 : covers and uncovers 5 : awash 6 : subject to inundation or flooding 7 : floating	EN	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1

Comment [j36]: S-57 Extension 06/01.

Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
— Authority			(S) TE	1,1
— Nationality			(S) TE	1,1
— ID code			(S) TE	0,1
— Source			(S) TE	0,1
— Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

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

8.6.1   Coastline

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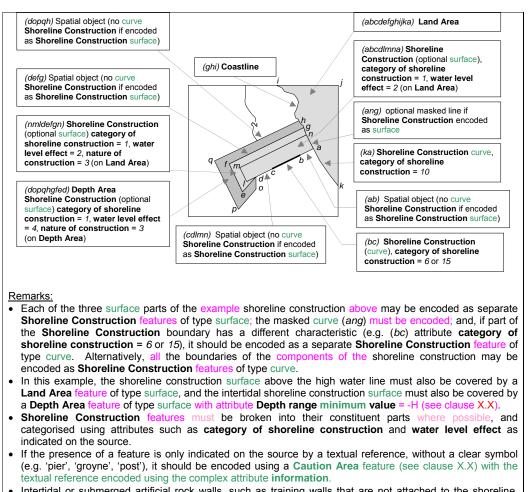
These features form the border of the **Land Area** feature.

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

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

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

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

(dopqh) Spatial object (no curve **Shoreline Construction** if encoded as **Shoreline Construction** surface)

(defg) Spatial object (no curve **Shoreline Construction** if encoded as **Shoreline Construction** surface)

(nmldefgn) Shoreline Construction (optional surface) **category of shoreline construction** = *1*, **water level effect** = *2*, **nature of construction** = *3* (on **Land Area**)

(dopqhgfed) Depth Area Shoreline Construction (optional surface) **category of shoreline construction** = *1*, **water level effect** = *4*, **nature of construction** = *3* (on **Depth Area**)

(ghi) Coastline

(cdlmn) Spatial object (no curve **Shoreline Construction** if encoded as **Shoreline Construction** surface)

(abcdefghijka) Land Area

(abcdlmna) Shoreline Construction (optional surface), **category of shoreline construction** = *1*, **water level effect** = *2* (on **Land Area**)

(ang) optional masked line if **Shoreline Construction** encoded as surface

(ka) Shoreline Construction curve, **category of shoreline construction** = *10*

(ab) Spatial object (no curve **Shoreline Construction** if encoded as **Shoreline Construction** surface)

(bc) Shoreline Construction (curve), **category of shoreline construction** = *6* or *15*

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

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

8.7   Causeway

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

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

INT 1 Reference: F 3

8.7.1   Causeways (see S-4 – B-313.3)

A causeway is a raised roadway of solid structure built primarily to provide a route across wet ground or an intertidal area.

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

Remarks:
• No remarks.

Distinction: Dam; road.

8.8   Canal

<table>
<tr><td>IHO Definition: CANAL. An artificial waterway with no flow, or a controlled flow, used for navigation, or for draining or irrigating land (ditch). (IHO Dictionary – S-32).</td></tr>
<tr><td>S-101 Geo Feature: Canal (CANALS)</td></tr>
<tr><td>Primitives: Curve, Surface</td></tr>
</table>

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of canal	(CATCAN)	1 : transportation 2 : drainage 3 : irrigation	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Horizontal clearance fixed			C	0,1
Clearance value horizontal	(HORCLR)		(S) RE	1,1
Horizontal distance uncertainty	(HORACC)		(S) RE	0,1
Horizontal width	(HORWID)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Status	(STATUS)	1 : permanent 3 : recommended 4 : not in use 5 : periodic/intermittent 6 : reserved 8 : private 14 : public 19 : buoyed	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1

Comment [j37]: S-57 Extension 06/01.

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

INT 1 Reference: F 40

8.8.1   Canals (see S-4 – B-361)

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

Remarks:
- If the canal is navigable at the maximum display scale for the ENC data, it must be encoded using the features **Depth Area** or **Dredged Area** (see clause X.X), and the canal banks must be encoded using the features **Coastline** or **Shoreline Construction**. The canal must not be encoded as a **Canal** feature. If it is required to encode the name of the canal, it must be done using a **Sea Area/Named Water Area** feature, with attribute **category of sea area** = _51_ (canal).
- Where the canal is navigable at the maximum display scale for the ENC data, special consideration should be given to encoding features specific to the canal such as minimum depths within the navigable area; overhead clearances; distances along the canal; and locks and lock gates (and any associated traffic signals).
- If it is required to encode a canal that is not navigable at the maximum display scale for the ENC data, it must be done using **Canal**, covered by a **Land Area** or **Unsurveyed Area** feature. The name of the canal should be encoded using the complex attribute **feature name** on the **Canal** feature.

Distinction: River; lake; tideway.

8.9   Distance mark

<table>
<tr><td colspan="5">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 Edition 3.1, Appendix A – Chapter 1, Page 1.55, November 2000).</td></tr>
<tr><td colspan="5">S-101 Geo Feature: Distance mark (DISMAR)</td></tr>
<tr><td colspan="5">Primitives: Point</td></tr>
<tr><td colspan="2"><i>Real World</i></td><td colspan="2"><i>Paper Chart Symbol</i></td><td><i>ECDIS Symbol</i></td></tr>
<tr><td>S-101 Attribute</td><td>S-57 Acronym</td><td>Allowable Encoding Value</td><td>Type</td><td>Multiplicity</td></tr>
<tr><td>Category of distance mark</td><td>(CATDIS)</td><td>1 : distance mark not physically installed
2 : visible mark, pole
3 : visible mark, board
4 : visible mark, unknown shape</td><td>EN</td><td>0,1</td></tr>
<tr><td>Feature name</td><td></td><td></td><td>C</td><td>0,*</td></tr>
<tr><td>Category of name</td><td></td><td>1 : official name
2 : alternate name
3 : common name
4 : short name
5 : display name</td><td>(S) EN</td><td>0,1</td></tr>
<tr><td>Display name</td><td></td><td></td><td>(S) BO</td><td>0,1</td></tr>
<tr><td>Language</td><td></td><td>ISO 639-3</td><td>(S) TE</td><td>0,1</td></tr>
<tr><td>Name</td><td>(OBJNAM)</td><td></td><td>(S) TE</td><td>1,1</td></tr>
<tr><td>Fixed date range</td><td></td><td></td><td>C</td><td>0,1</td></tr>
<tr><td>Date end</td><td>(DATEND)</td><td>ISO 8601:1988</td><td>(S) DA</td><td>0,1</td></tr>
<tr><td>Date start</td><td>(DATSTA)</td><td>ISO 8601:1988</td><td>(S) DA</td><td>0,1</td></tr>
<tr><td>Information</td><td></td><td></td><td>C</td><td>0,*</td></tr>
<tr><td>Language</td><td></td><td>ISO 639-3</td><td>(S) TE</td><td>0,1</td></tr>
<tr><td>Text</td><td>(INFORM)</td><td></td><td>(S) TE</td><td>1,1</td></tr>
<tr><td>Measured distance value</td><td></td><td></td><td>C</td><td>1,1</td></tr>
<tr><td>Distance unit of measurement</td><td></td><td>1 : metres
2 : yards
3 : kilometres
4 : statute miles
5 : nautical miles</td><td>(S) EN</td><td>1,1</td></tr>
<tr><td>Reference location</td><td></td><td></td><td>(S) TE</td><td>0,1</td></tr>
<tr><td>Waterway distance</td><td></td><td></td><td>(S) RE</td><td>1,1</td></tr>
<tr><td>Textual description</td><td></td><td></td><td>C</td><td>0,*</td></tr>
<tr><td>File reference</td><td>(TXTDSC)</td><td></td><td>(S) TE</td><td>1,1</td></tr>
<tr><td>Language</td><td></td><td>ISO 639-3</td><td>(S) TE</td><td>0,1</td></tr>
<tr><td>Scale minimum</td><td>(SCAMIN)</td><td>See clause X.X</td><td>IN</td><td>0,1</td></tr>
<tr><td>Recording date</td><td>(RECDAT)</td><td>ISO 8601:1988</td><td>DA</td><td>0,1</td></tr>
<tr><td>Recording indication</td><td>(RECIND)</td><td></td><td>TE</td><td>0,1</td></tr>
</table>

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

INT 1 Reference: B 25.1-2

8.9.1   Distance marks (see S-4 – B-307 and B-361.3)

Marks which indicate distances along a channel in nautical miles, kilometres or some other unit of measure are considered to be useful on the largest maximum display scale ENC data.

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

Remarks:
- No remarks.

Distinction: Beacon, special purpose.

8.10   Gate

IHO Definition: **GATE**. A structure that may be swung, drawn, or lowered to block an entrance or passageway on a watercourse. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2012).
S-101 Geo Feature: Gate (GATCON)
Primitives: Point, Curve, Surface

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of gate	(CATGAT)	2 : flood barrage gate 3 : caisson 4 : lock gate 5 : dyke gate 6 : sluice	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Depth range minimum value	(DRVAL1)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Horizontal clearance open			C	0,1
Clearance value horizontal			(S) RE	1,1
Horizontal distance uncertainty	(HORACC)		(S) RE	0,1
Nature of construction	(NATCON)	1 : masonry 2 : concreted 6 : wooden 7 : metal 9 : painted	EN	0,*
Quality of sounding measurement	(QUASOU)	2 : depth or least depth unknown 3 : doubtful sounding 4 : unreliable sounding 6 : least depth known 7 : least depth unknown, safe clearance at value shown	EN	0,*
Sounding uncertainty	(SOUACC)		RE	0,1
Status	(STATUS)	1 : permanent 4 : not in use 6 : reserved 16 : watched 17 : un-watched 19 : buoyed	EN	0,*

Comment [j38]: MD8 – 4.Co.11 and 4.Cl.9.

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

Vertical clearance open			C	0,1
Clearance value vertical	(VERCOP)		(S) RE	1,1
Vertical uncertainty	(VERACC)		(S) RE	0,1
Vertical datum	(VERDAT)	1 : Mean low water springs 2 : Mean lower low water springs 3 : Mean sea level 4 : Lowest low water 5 : Mean low water 6 : Lowest low water springs 7 : Approximate mean low water springs 8 : Indian spring low water 9 : Low water springs 10 : Approximate lowest astronomical tide 11 : Nearly lowest low water 12 : Mean lower low water 13 : Low water 14 : Approximate mean low water 15 : Approximate mean lower low water 16 : Mean high water 17 : Mean high water springs 18 : High water 19 : Approximate mean sea level 20 : High water springs 21 : Mean higher high water 22 : Equinoctial spring low water 23 : Lowest astronomical tide 24 : Local datum 25 : International great lakes datum 1985 26 : Mean water level 27 : Lower low water large tide 28 : Higher high water large tide 29 : Nearly highest high water 30 : Highest astronomical tide (HAT)	EN	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1

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

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

8.10.1   Gates (see S-4 – B-326.5-7)

If it is required to encode a gate that controls the flow of water, it must be done using the feature **Gate**. Gates should always be encoded in the closed (to the sea) position.

Remarks:
- **Gate** of type surface must also be covered by a **Depth Area**, **Unsurveyed Area** or **Land Area** feature.
- The attribute **depth range minimum value** is used to encode the minimum depth over the sill, where known.

Distinction: Dry dock; floating dock.

8.11 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).
S-101 Geo Feature: Dam (DAMCON)
Primitives: Curve, Surface

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of dam	(CATDAM)	1 : weir 2 : dam 3 : flood barrage	EN	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Height	(HEIGHT)		RE	0,1
Nature of construction	(NATCON)	1 : masonry 2 : concreted 3 : loose boulders	EN	0,*

		4 : hard surfaced 5 : unsurfaced 6 : wooden 7 : metal 9 : painted		
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 3 : recommended 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 9 : mandatory 11 : extinguished 12 : illuminated 13 : historic 14 : public 15 : synchronized 16 : watched 17 : un-watched 18 : existence doubtful 19 : buoyed	EN	0,*
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1

Water level effect	(WATLEV)	1 : partly submerged at high
		  water
		2 : always dry
		3 : always under water /
		  submerged
		4 : covers and uncovers
		5 : awash
		6 : subject to inundation or
		  flooding
			EN	0,1

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

Comment [j40]: S-57 Extension 06/01.

INT 1 Reference: F 43, 44

8.11.1   Dams (see S-4 –B-364.2)

If it is required to encode a dam, weir or flood barrage, it must be done using the feature **Dam**.

- When a **Dam** feature is of type surface, it must be covered by a **Land Area** feature.

- The geometry of the dam includes any gates. Gates should be encoded as separate **Gate** features.
- If it is required to encode a dam whose seaward edge is coincident with the coastline, it must be done using **Dam**, with a **Shoreline Construction** feature of type curve along its seaward edge, with no value populated for the attribute **category of shoreline construction**.
- If it is required to encode a submerged weir, it should be done using an **Dam** feature, with attribute **water level effect** = *3* (always under water/submerged).

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

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

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

Distinction: Causeway; dyke; road.

8.12 Crane

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).
S-101 Geo Feature: Crane (CRANES)
Primitives: Point, Surface

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of crane	(CATCRN)	2 : container crane/gantry 3 : sheerlegs 4 : travelling crane 5 : A-frame	EN	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
In the water			BO	0,1
Lifting capacity	(LIFCAP)		RE	0,1
Orientation			C	0,1
Orientation uncertainty			(S) RE	0,1

Orientation value	(ORIENT)		(S) RE	1,1
Radar conspicuous	(CONRAD)		BO	0,1
Radius	(RADIUS)		RE	0,1
Status	(STATUS)	1 : permanent 4 : not in use 6 : reserved 12 : illuminated	EN	0,*
Vertical clearance fixed			C	0,1
Clearance value vertical	(VERCLR)		(S) RE	1,1
Vertical uncertainty	(VERACC)		(S) RE	0,1
Vertical datum	(VERDAT)	~~1 : Mean low water springs~~ ~~2 : Mean lower low water springs~~ 3 : Mean sea level ~~4 : Lowest low water~~ ~~5 : Mean low water~~ ~~6 : Lowest low water springs~~ ~~7 : Approximate mean low water springs~~ ~~8 : Indian spring low water~~ ~~9 : Low water springs~~ ~~10 : Approximate lowest astronomical tide~~ ~~11 : Nearly lowest low water~~ ~~12 : Mean lower low water~~ ~~13 : Low water~~ ~~14 : Approximate mean low water~~ ~~15 : Approximate mean lower low water~~ 16 : Mean high water 17 : Mean high water springs 18 : High water 19 : Approximate mean sea level 20 : High water springs 21 : Mean higher high water ~~22 : Equinoctial spring low water~~ ~~23 : Lowest astronomical tide~~ 24 : Local datum 25 : International great lakes datum 1985 26 : Mean water level ~~27 : Lower low water large tide~~ 28 : Higher high water large tide 29 : Nearly highest high water 30 : Highest astronomical tide (HAT)	EN	0,1
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1

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

INT 1 Reference: F 53.1-3

8.12.1   Cranes (see S-4 – B-328.3)

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

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

Distinction:

8.13　Berth

IHO Definition:　**BERTH**.　Place in which a ship is moored at wharf.　(IHO Dictionary – S-32).	

S-101 Geo Feature:　Berth　(BERTHS)

Primitives:　Point, Curve, Surface

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Depth range minimum value	(DRVAL1)		RE	0,1
Feature name			C	1,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Horizontal clearance length			RE	0,1
Horizontal clearance width			RE	0,1
Maximum permitted draught			RE	0,1
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Quality of sounding measurement	(QUASOU)	1 : depth known 2 : depth or least depth unknown ~~3 : doubtful sounding~~ ~~4 : unreliable sounding~~ 6 : least depth known 10 : maintained depth 11 : not regularly maintained	EN	0,*
Sounding uncertainty	(SOUACC)		RE	0,1
Status	(STATUS)	1 : permanent 2 : occasional 5 : periodic/intermittent 7 : temporary 9 : mandatory 12 : illuminated 16 : watched 17 : un-watched	EN	0,*
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*

Comment [j41]: MD8 – 4.Co.11 and 4.Cl.9.

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

INT 1 Reference: F 12, 19

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

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

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

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

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

8.14   Mooring/warping facility

IHO Definition: **MOORING/WARPING FACILITY**. The equipment or structure used to secure a vessel. (Adapted from IHO Dictionary – S-32).	
S-101 Geo Feature: Mooring/warping facility (MORFAC)	
Primitives: Point, Curve, Surface	

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

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

		~~depth area~~		
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Height	(HEIGHT)		RE	0,1
Nature of construction	(NATCON)	1 : masonry 2 : concreted 6 : wooden 7 : metal 9 : painted	EN	0,*
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Quality of sounding measurement	(QUASOU)	2 : depth or least depth unknown 3 : doubtful sounding 4 : unreliable sounding 6 : least depth known 7 : least depth unknown, safe clearance at value shown	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 3 : recommended 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 12 : illuminated 14 : public 18 : existence doubtful	EN	0,*
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Water level effect	(WATLEV)	1 : partly submerged at high water 2 : always dry 3 : always under water / submerged 4 : covers and uncovers 5 : awash 6 : subject to inundation or flooding	EN	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1

Comment [j43]: MD8 – 4.Co.11 and 4.Cl.9.

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

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

8.14.1 Mooring / warping facilities (see S-4 – B-327.1-4; B-431.5-6)
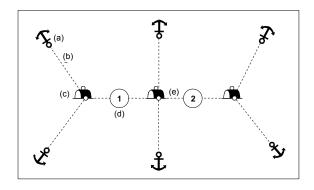
If it is required to encode a mooring/warping facility, it must be done using the feature **Mooring/Warping Facility**.

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

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

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

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

A complete mooring trot is composed of ground tackle, mooring cables, buoys and mooring berths on junction cables. The following remarks refer to the annotations in the Figure above:
(a) Ground tackle should be encoded using **Obstruction** features (see clause X.X), with attribute **category of obstruction** = *9* (ground tackle).

(b) Mooring cables should be encoded using **Cable Submarine** features (see clause X.X), with attribute **category of cable** = *6* (mooring cable/chain).
(c) Buoys should be encoded using **Mooring/Warping Facility** features, with attribute **category of mooring/warping facility =** *7* (mooring buoy).
(d) Mooring berths should be encoded using **Berth** features.
(e) Junction cables should be encoded using **Mooring/Warping Facility** features, with attribute **category of mooring/warping facility** = *6* (chain/wire/cable).

All these features should be aggregated using the named aggregation feature "Mooring Trot" (see clause X.X), with the name of the mooring trot being populated using the complex attribute **feature name** for the named aggregation.

Distinction: Beacon, special purpose/general; buoy, special purpose/general; pile.

8.15   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).				

S-101 Geo Feature: Dry dock (DRYDOC)

Primitives: Surface

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
Depth range minimum value	(DRVAL1)		RE	0,1
Elevation	(ELEVAT)		RE	0,1
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Horizontal clearance length			RE	0,1
Horizontal clearance width			RE	0,1
Horizontal length	(HORLEN)		RE	0,1
Horizontal width	(HORWID)		RE	0,1
Maximum permitted draught			RE	0,1
Quality of sounding measurement	(QUASOU)	2 : depth or least depth unknown 3 : doubtful sounding 4 : unreliable sounding 6 : least depth known 7 : least depth unknown, safe clearance at value shown 8 : value reported (not surveyed) 9 : value reported (not confirmed)	EN	0,*
Sounding uncertainty	(SOUACC)		RE	0,1
Status	(STATUS)	1 : permanent 4 : not in use 6 : reserved 8 : private 12 : illuminated 14 : public	EN	0,*
Information			C	0,*

Comment [j44]: MD8 – 4.Co.11 and 4.Cl.9.

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

INT 1 Reference: F 25

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

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

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

Remarks:
- A dry dock must also be covered by a **Land Area** feature. The boundary of a dry dock must not be encoded as a separate feature (**Coastline** or **Shoreline Construction**), except for the gate feature (**Gate**), which may be encoded.
- The attributes **horizontal clearance length** and **horizontal clearance width** are used to encode the length and width of the navigable part of the dry dock when the gate is open as declared by a competent authority, where known. If required, the minimum physical length and width of the dry dock itself must be populated using the attributes **horizontal length** and **horizontal width**.
- The attributes **depth range minimum value** and **maximum permitted draught** are used to encode the shoalest physical depth in the dock when the gate is open and maximum draught permitted in the dock respectively, where known.

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

8.16   Floating dock

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

S-101 Geo Feature: Floating dock (FLODOC)

Primitives: Point, Curve, Surface

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Depth range minimum value	(DRVAL1)		RE	0,1
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Horizontal clearance length			RE	0,1
Horizontal clearance width			RE	0,1
Horizontal length	(HORLEN)		RE	0,1
Horizontal width	(HORWID)		RE	0,1

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

INT 1 Reference: F 26

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

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

Remarks:
- A **Floating Dock** feature must also be covered by **Depth Area** or **Unsurveyed Area** features. The boundary of a **Floating Dock** feature of type surface must not be encoded as a separate feature (**Coastline** or **Shoreline Construction**).
- The attributes **horizontal clearance length** and **horizontal clearance width** are used to encode the length and width of the navigable part of the floating dock as declared by a competent authority, where known. If required, the minimum physical length and width of the dry dock itself must be populated using the attributes **horizontal length** and **horizontal width**.
- The attribute **depth range minimum value** is used to encode the shoalest depth of the dock when flooded, and the attribute **maximum permitted draught** is used to encode the maximum draught permitted in the dock, where known.

Distinction: Dock area; dry dock.

8.17 Pontoon

IHO Definition: **PONTOON**. A floating structure, usually rectangular in shape which serves as landing, pier head, ~~or~~ bridge support, etc. (Adapted from IHO Dictionary – S-32).	**Comment [j45]:** MD8 – 4.Co.7 and 4.Cl.5

S-101 Geo Feature: Pontoon (PONTON)

Primitives: Point, Curve, Surface

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
~~Function~~	~~(FUNCTN)~~	~~2 : harbour-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~~	~~EN~~	~~0,*~~

		32 : radar 33 : light support 34 : microwave 35 : cooling 36 : observation 37 : time ball 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 47 : boathouse		
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 12 : illuminated 14 : public	EN	0,*
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: F 16

8.17.1   Pontoons (see S-4 – B-324.3)

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

Remarks:

- A **Pontoon** feature must also be covered by **Depth Area** or **Unsurveyed Area** features. A **Pontoon** feature of type surface must not be bound by curve features **Coastline** or **Shoreline Construction**, unless

Comment [A47]: TSMAD21.

Comment [j48]: Refer CSPCWG Letter 03/2011.

the edge associated with the curve feature is also the boundary of a **Land Area** feature of type surface.

<u>Distinction:</u> Bridge; mooring/warping facility; shoreline construction.

8.18   Dock area

IHO Definition: **DOCK AREA**. An artificially enclosed area within which ships may moor and which may have gates to regulate water level. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.56, November 2000).

S-101 Geo Feature: Dock area (DOCARE)

Primitives: Surface

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Category of dock	(CATDOC)	1: tidal 2: non-tidal (wet dock)	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Horizontal clearance fixed			C	0,1
Clearance value horizontal	(HORCLR)		(S) RE	1,1
Horizontal distance uncertainty	(HORACC)		(S) RE	0,1
Horizontal clearance length			RE	0,1
Horizontal clearance width			RE	0,1
Maximum permitted draught			RE	0,1
Status	(STATUS)	1 : permanent 4 : not in use 6 : reserved 8 : private 14 : public	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1

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

INT 1 Reference: F 27, 28

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

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

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

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

8.19   Gridiron

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

S-101 Geo Feature: Gridiron (GRIDRN)

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

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Horizontal length	(HORLEN)		RE	0,1
Horizontal width	(HORWID)		RE	0,1
Nature of construction	(NATCON)	1 : masonry 2 : concreted 6 : wooden 7 : metal 9 : painted 10 : latticed	EN	0,*
Status	(STATUS)	1 : permanent 4 : not in use 6 : reserved 8 : private 14 : public 19 : buoyed	EN	0,*
Vertical length	(VERLEN)		RE	0,1
Water level effect	(WATLEV)	1 : partly submerged at high water 4 : covers and uncovers 5 : awash	EN	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
~~Recording date~~	~~(RECDAT)~~	~~ISO 8601:1988~~	~~DA~~	~~0,1~~
~~Recording indication~~	~~(RECIND)~~		~~TE~~	~~0,1~~

Comment [j50]: S-57 Extension 06/01.

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

INT 1 Reference: F 24

8.19.1 Gridirons (see S-4- B-326.8)

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

Remarks:
- Due to gridirons normally being located in intertidal areas, it is only required to encode **Gridiron** on the largest maximum display scale ENC data.

Distinction: Dry dock; floating dock.

8.20   Locks

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

S-101 Geo Feature: Lock basin (LOKBSN)

Primitives: **Surface**

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

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

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

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

INT 1 Reference: F 41.1

8.20.1   Locks (see S-4 – B-326.6)

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

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

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

Distinction: Canal; gate.

9   Topographic Terms

9.1   Sea area/named water area

<table>
<tr><td colspan="5">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 Edition 3.1, Appendix A – Chapter 1, Page 1.151, November 2000).</td></tr>
<tr><td colspan="5"><u>S-101 Geo Feature:</u> Sea area/named water area (SEAARE)</td></tr>
<tr><td colspan="5"><u>Primitives:</u> Point, Surface</td></tr>
<tr><td colspan="2">Real World</td><td colspan="2">Paper Chart Symbol</td><td>ECDIS Symbol</td></tr>
<tr><td>S-101 Attribute</td><td>S-57 Acronym</td><td colspan="2">Allowable Encoding Value</td><td>Type</td><td>Multiplicity</td></tr>
</table>

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of sea area	(CATSEA)	2 : gat 3 : bank 4 : deep 5 : bay 6 : trench 7 : basin 8 : mud flats 9 : reef 10 : ledge 11 : canyon 12 : narrows 13 : shoal 14 : knoll 15 : ridge 16 : seamount 17 : pinnacle 18 : abyssal plain 19 : plateau 20 : spur 21 : shelf 22 : trough 23 : saddle 24 : abyssal hills 25 : apron 26 : archipelagic apron 27 : borderland 28 : continental margin 29 : continental rise 30 : escarpment 31 : fan 32 : fracture zone 33 : gap 34 : guyot 35 : hill 36 : hole 37 : levee 38 : median valley 39 : moat 40 : mountains 41 : peak 42 : province 43 : rise 44 : sea channel 45 : seamount chain 46 : shelf-edge 47 : sill 48 : slope	EN	0,1

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

INT 1 Reference:

9.1.1   Sea areas (see S-4 – B-550)

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

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

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

10 Tides, Currents

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

The inclusion of tidal information in ECDIS is optional. As such, for ENC only tidal stream and current information is required to be encoded. The implementation of tidal models based on predictions or applications to incorporate real-time tidal observations in ECDIS will be the subject of additional Product Specifications utilising the S-100 Universal Hydrographic Data Model.

10.2   Tidal stream – flood/ebb

<u>IHO Definition:</u> **TIDAL STREAMS**. The alternating horizontal movement of water associated with the rise and fall of the tide caused by tide-producing forces. Also called tidal current.   (IHO Dictionary – S-32).

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

<u>S-101 Geo Feature:</u> Tide stream – flood/ebb (TS_FEB)

<u>Primitives:</u> Point, Surface

Real World	Paper Chart Symbol	ECDIS Symbol		

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of tidal stream	(CAT_TS)	1 : flood stream 2 : ebb stream 3 : other tidal flow	EN	1,1
Current velocity			C	1,1
Velocity maximum	(CURVEL)	velocity maximum > velocity minimum	(S) RE	1,1
Velocity minimum		velocity minimum < velocity maximum	(S) RE	0,1
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Orientation			C	0,1
Orientation uncertainty			(S) RE	0,1
Orientation value	(ORIENT)		(S) RE	1,1
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Status	(STATUS)	5 : periodic/intermittent	EN	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference			(S) TE	1,1
Language	(TXTDSC)	ISO 639-3	(S) TE	0,1

Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
— Authority			(S) TE	1,1
— Nationality			(S) TE	1,1
— ID code			(S) TE	0,1
— Source			(S) TE	0,1
— Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: H 40, 41

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

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

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

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

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

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

10.3 Current – non-gravitational

IHO Definition: **CURRENT – NON-GRAVITATIONAL**. Any current that is caused by other than tide producing forces. Also called nontidal current. (IHO Dictionary – S-32).

S-101 Geo Feature: Current – non-gravitational (CURENT)

Primitives: Point, Curve, Surface

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Current velocity			C	1,1
Velocity maximum	(CURVEL)	velocity maximum > velocity minimum	(S) RE	1,1
Velocity minimum		velocity minimum < velocity maximum	(S) RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Orientation			C	1,1
Orientation uncertainty			(S) RE	0,1
Orientation value	(ORIENT)		(S) RE	1,1
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Status	(STATUS)	5 : periodic/intermittent	EN	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*

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

INT 1 Reference: H 42, 43

10.3.1   Current data (see S-4 – B-408)

The term "current(s)" in this document is used to describe water movements which are generally constant in direction, and are not dependent on astronomical conditions (i.e. are non-gravitational). A current is described by the direction towards which it is running. For tidal streams, see clauses X.X and X.X.

Currents occur as:
- The flow of river water in rivers and estuaries;
- Permanent flows in other restricted waters e.g. İstanbul Boğazı (Bosporus);
- Permanent or seasonal oceanic currents;
- Temporary wind-induced currents.

Only surface currents should be encoded. It is particularly important to depict currents (both the main flows and permanent eddies) which could set a vessel towards dangers.

If it is required to encode a non-gravitational current, it must be done using the feature **Current – Non-gravitational**.

Remarks:
- Maximum rates (velocities) of currents, where known, must be encoded in knots using the complex attribute **current velocity**, and should be quoted to one decimal place. Ideally, the minimum and maximum strengths should be quoted, where known, if the strength varies.
- In tidal waters where the flow of river water alternately reinforces the ebb tidal stream and reduces the flood, the combined effect must be encoded, where required, for the convenience of the navigator, i.e. the combined current must be encoded using the features **Tide Stream – Flood/Ebb** or **Tide Stream Panel Data** (see clauses X.X and X.X). In restricted waters where tides are negligible, the direction and/or rate of flow should be encoded using **Current – Non-gravitational**.
- Ocean currents are permanent or seasonal, are somewhat variable in strength and direction, and generally cover broad areas. Where required, this information must be encoded using **Current – Non-gravitational** of type surface. In cases where the current strength and direction are subject to seasonal variations, this should be indicated using the complex attribute **periodic date range**. This may require multiple **Current – Non-gravitational** features with attributes populated in accordance with the seasonal variations to be coincident in the ENC. Where the direction of an ocean current is so variable that it is not practicable to show this information, the complex attribute **orientation** (**orientation value**) must be populated with an empty (null) value. This may generally occur when the **Current – Non-gravitational** is encoded as type surface.
- Local weather conditions can produce significant temporary wind-induced currents which cannot be charted. If there is a known hazard, e.g. if winds from a particular direction have been found to endanger vessels by setting them on to shoals unexpectedly, a cautionary note may be added using the feature **Caution Area** (see clause X.X). If considered necessary, the note may refer to further information in other publications, such as Sailing Directions.

Distinction: Tidal stream (flood/ebb); tidal stream - harmonic prediction; tidal stream - non harmonic prediction; tidal stream panel data; tidal stream - time series.

10.4   Water turbulence

<table>
<tr><td colspan="6">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. (IHO Dictionary – S-32).</td></tr>
<tr><td colspan="6">S-101 Geo Feature: Water turbulence (WATTUR)</td></tr>
<tr><td colspan="6">Primitives: Point, Curve, Surface</td></tr>
<tr><td colspan="2">Real World</td><td colspan="2">Paper Chart Symbol</td><td colspan="2">ECDIS Symbol</td></tr>
<tr><td colspan="2">S-101 Attribute</td><td>S-57 Acronym</td><td>Allowable Encoding Value</td><td>Type</td><td>Multiplicity</td></tr>
<tr><td colspan="2">Category of water turbulence</td><td>(CATWAT)</td><td>1 : breakers
2 : eddies
3 : overfalls
4 : tide rips
5 : bombora</td><td>EN</td><td>1,1</td></tr>
<tr><td colspan="2">Feature name</td><td></td><td></td><td>C</td><td>0,*</td></tr>
<tr><td colspan="2"><s>Category of name</s></td><td></td><td><s>1 : official name
2 : alternate name
3 : common name
4 : short name
5 : display name</s></td><td><s>(S) EN</s></td><td><s>0,1</s></td></tr>
<tr><td></td><td>Display name</td><td></td><td></td><td>(S) BO</td><td>0,1</td></tr>
<tr><td></td><td>Language</td><td></td><td>ISO 639-3</td><td>(S) TE</td><td>0,1</td></tr>
<tr><td></td><td>Name</td><td>(OBJNAM)</td><td></td><td>(S) TE</td><td>1,1</td></tr>
<tr><td colspan="2">Information</td><td></td><td></td><td>C</td><td>0,*</td></tr>
<tr><td></td><td>Language</td><td></td><td>ISO 639-3</td><td>(S) TE</td><td>0,1</td></tr>
<tr><td></td><td>Text</td><td>(INFORM)</td><td></td><td>(S) TE</td><td>1,1</td></tr>
<tr><td colspan="2">Textual description</td><td></td><td></td><td>C</td><td>0,*</td></tr>
<tr><td></td><td>File reference</td><td>(TXTDSC)</td><td></td><td>(S) TE</td><td>1,1</td></tr>
<tr><td></td><td>Language</td><td></td><td>ISO 639-3</td><td>(S) TE</td><td>0,1</td></tr>
<tr><td colspan="2">Scale minimum</td><td>(SCAMIN)</td><td>See clause X.X</td><td>IN</td><td>0,1</td></tr>
<tr><td colspan="2"><s>Recording date</s></td><td><s>(RECDAT)</s></td><td><s>ISO 8601:1988</s></td><td><s>DA</s></td><td><s>0,1</s></td></tr>
<tr><td colspan="2"><s>Recording indication</s></td><td><s>(RECIND)</s></td><td></td><td><s>TE</s></td><td><s>0,1</s></td></tr>
<tr><td colspan="2"><s>Source indication</s></td><td></td><td></td><td><s>C</s></td><td><s>0,*</s></td></tr>
<tr><td></td><td><s>Authority</s></td><td></td><td></td><td><s>(S) TE</s></td><td><s>1,1</s></td></tr>
<tr><td></td><td><s>Nationality</s></td><td></td><td></td><td><s>(S) TE</s></td><td><s>1,1</s></td></tr>
<tr><td></td><td><s>ID code</s></td><td></td><td></td><td><s>(S) TE</s></td><td><s>0,1</s></td></tr>
<tr><td></td><td><s>Source</s></td><td></td><td></td><td><s>(S) TE</s></td><td><s>0,1</s></td></tr>
<tr><td></td><td><s>Source date</s></td><td><s>(SORDAT)</s></td><td><s>ISO 8601:1988</s></td><td><s>(S) DA</s></td><td><s>1,1</s></td></tr>
<tr><td colspan="6">INT 1 Reference: H 44, 45; K 17

10.4.1   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 Water Turbulence.

Remarks:
If it is required to encode a breaker over an off-lying shoal, it must be done using a Water Turbulence feature at the same position as the feature causing the breaker (e.g. Underwater/Awash Rock).</td></tr>
</table>

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

Distinction:

10.5 Tidal stream panel data

IHO Definition: **TIDAL STREAM PANEL DATA**. A tidal stream (or tidal current) is an alternating horizontal movement of water associated with the rise and fall of the tide caused by tide-producing forces. (IHO Dictionary – S-32).
Approximate tidal stream rates may be given as discrete rate values at a specified interval before or after a high water. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.176, November 2000).

__S-101 Geo Feature:__ Tide stream panel data (TS_PAD)

__Primitives:__ Point, Surface

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Station name			(S) TE	1,1
Station number			(S) IN	0,1
Tidal stream panel values			C	1,* (ordered)
Reference tide		1 : high water 2 : low water	(S) EN	1,1
Reference tide type		1 : springs 2 : neaps 3 : mean	(S) EN	1,1
Stream depth			(S) RE	1,1
Tidal stream value			C	1,* (ordered)
Orientation			(S) C	1,1
Orientation uncertainty			(S) RE	0,1
Orientation value	(ORIENT)		(S) RE	1,1
Time relative to tide			(S) IN	1,1
Velocity maximum			(S) RE	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
~~Recording date~~	~~(RECDAT)~~	~~ISO 8601:1988~~	~~DA~~	~~0,1~~

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

INT 1 Reference: H 31,46

10.5.1   Tidal stream panels (see S-4 – B-407 and B-407.2-3)

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

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 **Tide Stream Panel Data**.

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.

Remarks:
- The mandatory complex attribute **tidal stream values** is structured such that, in combination with attributes **Station Name** and **Station Number**, the equivalent of a paper chart tidal stream panel can be reproduced in an ECDIS Pick Report display.

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

11 Depths

11.1   Generalisation of depth portrayal

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

a. Deeper soundings tend to be eliminated while the shoaler ones are retained for safety. Sufficient numbers of deeper soundings should be retained to show the full range of depth. This is to assist the navigator who uses their echo sounder to help verify their position, or the mariner choosing an anchorage of suitable depth.

b. Generalization proceeds by the inclusion of shoals lying to seaward of the principal contour, and by the smoothing of severely indented contours, with the effect of pushing the contours seaward. However, as a shoal which rises steeply from deep water is much more of a hazard than one which rises gradually, the encoder must ensure that the contours are not pushed seaward unduly. If the encoder gives the impression that a mariner will get warning of too close an approach to the danger, by relying on their echo sounder to show gradually shoaling depth - when the danger is, in fact "steep-to" - they may seriously mislead and endanger the ENC user.

c. With the "expansion" of shoals, described above, it may become increasingly difficult to find space on an ENC dataset to show the line of deepest soundings through a channel, or even to show a channel at all. Yet even at small maximum display scale s it is important to show the usable channels and indicate their least depth. The encoder may have to make greater use of depth contours than soundings in depicting narrow channels.

d. Even such dangers as drying rocks and islets require generalization in coastal areas. This is in recognition of the principle that, whereas they are particularly dangerous in isolation and must then be shown as precisely as possible, where they occur in groups a representative depiction is permissible, showing the outermost features as individually as space permits.

11.2   Representation of depth: General

Some of the principles of depth depiction are summarized below:

a. The least depth over shoals and banks, and over sills (bars) in navigable channels, must be shown. Particular attention should also be paid to full and accurate representation of all other "critical" areas, e.g. on and adjacent to leading lines, controlling depths in fairways and along recommended tracks, in anchorages, alongside jetties, quays and berths and in the entrances to harbours and basins. Maximum as well as minimum depth should be shown where possible, e.g. to show the line of deepest water in narrow channels. However, deeper soundings on the sloping side of a bank near to the crest line should not be selected if they could give the impression that there is a deeper passage across the crest between shoaler soundings.

b. Soundings and contours must be used to complement each other in giving a reasonable representation of the seabed, including all significant breaks of slope.

c. The density of soundings should be determined by the type of seabed. Flat or evenly sloping areas, and banks of unconsolidated sediment, should have a minimum of soundings, fairly evenly spaced, but gradually becoming more widely spaced as the depth increases. Irregular bottom topography should be represented by a denser, and probably irregular, pattern of soundings. A steep gradient should be represented by close contours, undistorted by soundings.

d. In changeable areas, where surveys of different dates adjoin and do not match exactly, gaps in the contours may be left to indicate the discontinuity of depth to the navigator.

e. Where practicable, soundings on smaller maximum display scale ENCs should be selected from those shown on the larger maximum display scale ENCs.

f. In areas navigable only at high water, drying heights must be selected according to the same principles as soundings.

g. Where surveys are inadequate, it may be advisable to omit some of the standard contour lines.

11.3 Sounding

IHO Definition: **SOUNDING**. Measured or charted depth of water, or the measurement of such a depth. (IHO Dictionary – S-32).
A measured water depth or spot which has been reduced to a vertical datum (may be a drying height). (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.163, November 2000).

S-101 Geo Feature: Sounding (SOUNDG)

Primitives: Point

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Exposition of sounding	(EXPSOU)	1 : within the range of depth of the surrounding depth area 2 : shoaler than the range of depth of the surrounding depth area 3 : deeper than the range of depth of the surrounding depth area	EN	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Quality of sounding measurement	(QUASOU)	1 : depth known 3 : doubtful sounding 4 : unreliable sounding 8 : value reported (not surveyed) 9 : value reported (not confirmed)	EN	0,*
Reported date		ISO 8601:1988	DA	0,1
Sounding uncertainty	(SOUACC)		RE	0,1
Status	(STATUS)	18 : existence doubtful	EN	0,*
Technique of sounding measurement	(TECSOU)	1 : found by echo-sounder 2 : found by side scan sonar 3 : found by multi-beam 4 : found by diver 5 : found by lead-line 6 : swept by wire-drag 7 : found by LIDAR 8 : swept by vertical acoustic system 9 : found by electromagnetic sensor 10 : photogrammetry 11 : satellite imagery 12 : found by levelling 13 : swept by side-scan	EN	0,*

		sonar 14 : computer generated Xx : synthetic aperture radar Xx : hyperspectral Xx : etc?		
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
~~Recording date~~	~~(RECDAT)~~	~~ISO 8601:1988~~	~~DA~~	~~0,1~~
~~Recording indication~~	~~(RECIND)~~		~~TE~~	~~0,1~~
~~Source indication~~			~~C~~	~~0,*~~
~~ Authority~~			~~(S) TE~~	~~1,1~~
~~ Nationality~~			~~(S) TE~~	~~1,1~~
~~ ID code~~			~~(S) TE~~	~~0,1~~
~~ Source~~			~~(S) TE~~	~~0,1~~
~~ Source date~~	~~(SORDAT)~~	~~ISO 8601:1988~~	~~(S) DA~~	~~1,1~~

INT 1 Reference: I 10, 14, 15

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

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

The geometry of soundings and no bottom found depths (see clause X.X) is held in a 3 dimensional array (latitude, longitude, depth). In the interests of efficiency, multiple soundings should be encoded in one spatial type, provided that all the spatial and geo feature attributes are common to the group.

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

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

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

Sounding	S-4	INT 1	quality of position	quality of sounding measurement	Remarks
In true position	B-412.1	I10		*1*or *<undefined>*	May be encoded using **quality of position** = *10*
Out of position on paper chart	B-412.2	I11 I12		*1*or *<undefined>*	Spatial type must be encoded at the true position. There is no "sounding, out of position" in an ENC.
Lower reliability	B-412.4	I14	*4*	*4*	
Drying	B-413	I15		*1*or *<undefined>*	Negative value
Doubtful	B-424.4	I2		*3*	Existence doubtful should be encoded using **status** = *18*

Reported but not confirmed		I3 I4	*8*	*9*	If available, the year of report must be encoded using the attribute **reported date**

Remarks:
- ~~The attribute **exposition of sounding** indicates features with a "value of sounding" within or not within the range of depth of the surrounding area .~~ Encoders are advised to use caution when considering encoding soundings that are shoaler than the range of depth of the surrounding depth area, as **Sounding** features will not be displayed when utilising some ECDIS display settings. Where it is considered that a sounding that is shoaler than the range of depth of the surrounding depth area may be a hazard to navigation, encoders should preferably conduct further investigation of source material in order to encode additional depth contour and depth area information more relevant to the sounding. Alternatively, encoders may consider using an alternate feature (e.g. **Obstruction**) to encode the depth.
- The attribute **technique of sounding measurement** must only be populated for **Sounding** features to indicate lower reliability soundings than indicated by the underlying meta feature **Quality of Bathymetric Data** (see clauses X.X and X.X)
- Where **Sounding** features are covered by the meta feature **Quality of Survey** (see clause X.X), the attribute **quality of sounding measurement** must not be populated unless different to the value of **quality of sounding measurement** populated for the **Quality of Survey**.
- For depths indicated as no bottom found, see clause X.X.

Distinction: Depth area; depth – no bottom found; obstruction; underwater/awash rock; wreck.

11.4   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).	
S-101 Geo Feature: Dredged area (DRGARE)	
Primitives: Surface	

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Depth range minimum value	(DRVAL1)		RE	1,1
Depth range maximum value	(DRVAL2)		RE	0,1
Dredged date			DA	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Quality of sounding measurement	(QUASOU)	10 : maintained depth 11 : not regularly maintained	EN	0,*
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 7 : entry prohibited 8 : entry restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transhipment (lightening) prohibited 25 : stopping prohibited 27 : speed restricted 28 : swimming prohibited	EN	0,*
Sounding uncertainty	(SOUACC)		RE	0,1

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

Technique of sounding measurement	(TECSOU)	1 : found by echo-sounder 2 : found by side scan sonar 3 : found by multi-beam 6 : swept by wire-drag 7 : found by LIDAR 8 : swept by vertical acoustic system 9 : found by electromagnetic sensor 11 : satellite imagery 13 : swept by side-scan sonar	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: I 20-23

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

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

Remarks:

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

Comment [j54]: S-58 tests 1533 and 1649.

Distinction: Depth area; dumping ground; swept area.

11.5   Swept area

IHO Definition: **SWEPT AREA**. An area that has been determined to be clear of navigational dangers to a specified depth. (IHO Dictionary – S-32).
S-101 Geo Feature: Swept area (SWPARE)
Primitives: Surface

Real World	Paper Chart Symbol	ECDIS Symbol

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

INT 1 Reference: I 24

11.5.1 Swept areas (see S-4 – B-415)

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

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

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

minimum value and **depth range** **maximum** value to be encoded on a **Depth Area** or **Dredged Area** feature, **depth range** **minimum** value should be set to the swept depth and **depth range** **maximum** value should be set to an empty (null) value.

Remarks:

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

Distinction: Depth area; dredged area; unsurveyed area.

Comment [j55]: S-58 test 1782.

11.6   Depth contour

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

S-101 Geo Feature: Depth contour (DEPCNT)

Primitives: Curve

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

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

INT 1 Reference: I 15, 30, 31
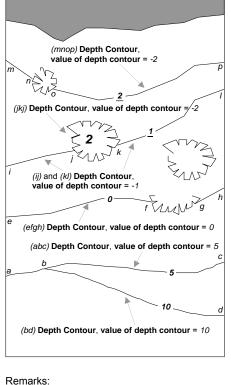
11.6.1   Depth contours (see S-4 – B-404.2; B-410; B-411 to B-411.5; B-413 and B-413.1)

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

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

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

Comment [j56]: TSMAD20 Action.

(mnop) **Depth Contour**,
value of depth contour = -2

_2_

(jkj) **Depth Contour**, **value of depth contour** = -2

_1_

2

(ij) and (kl) **Depth Contour**,
value of depth contour = -1

_0_

(efgh) **Depth Contour**, **value of depth contour** = 0

(abc) **Depth Contour**, **value of depth contour** = 5

_5_

_10_

(bd) **Depth Contour**, **value of depth contour** = 10

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

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

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

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

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

Distinction: Coastline; depth area; sounding.

11.7   Depth area

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

S-101 Geo Feature: Depth area (DEPARE)

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

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

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

Comment [j57]: MD8 – 4.Co.11 and 4.Cl.9.

INT 1 Reference:

11.7.1 Depth areas (see S-4 – B-410)

The sea area, the intertidal area and the navigable parts of rivers, lakes and canals must be divided into depth areas, each of them having a range of depth.
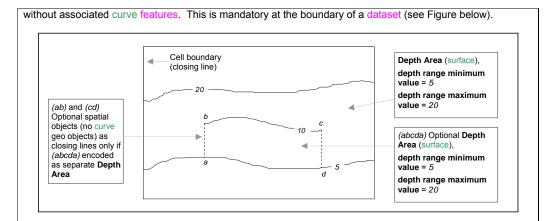
As many depth areas as possible must be created using encoded depth contours.

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

11.7.2 Geometry of depth areas

Where surfaces are not closed on the source, it may be necessary to close these surfaces using edges

without associated curve features. This is mandatory at the boundary of a dataset (see Figure below).

Cell boundary
(closing line)

Depth Area (surface),
depth range minimum value = 5
depth range maximum value = 20

(ab) and (cd) Optional spatial objects (no curve geo objects) as closing lines only if (abcda) encoded as separate Depth Area

20

b   c
          10

a

d   5

(abcda) Optional Depth Area (surface),
depth range minimum value = 5
depth range maximum value = 20

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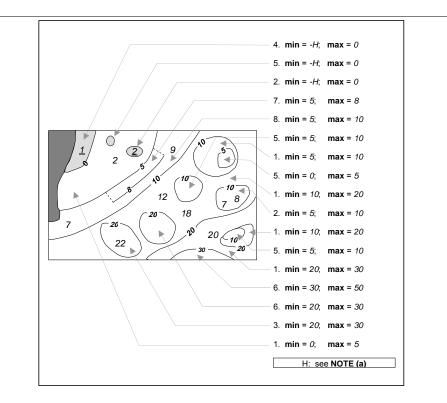
11.7.3 Use of attributes depth range minimum value and depth range maximum value for depth areas in general

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

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

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

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

4. **min** = *-H*;   **max** = *0*
5. **min** = *-H*;   **max** = *0*
2. **min** = *-H*;   **max** = *0*
7. **min** = *5*;   **max** = *8*
8. **min** = *5*;   **max** = *10*
5. **min** = *5*;   **max** = *10*
1. **min** = *5*;   **max** = *10*
5. **min** = *0*;   **max** = *5*
1. **min** = *10*;   **max** = *20*
2. **min** = *5*;   **max** = *10*
1. **min** = *10*;   **max** = *20*
5. **min** = *5*;   **max** = *10*
1. **min** = *20*;   **max** = *30*
6. **min** = *30*;   **max** = *50*
6. **min** = *20*;   **max** = *30*
3. **min** = *20*;   **max** = *30*
1. **min** = *0*;   **max** = *5*

H: see **NOTE (a)**

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

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

1. If the depth area is bounded by two or more depth contours:
   - **depth range minimum value** should take the value of the dataset depth contour immediately shallower than the value of **depth range maximum value**.
   - **depth range maximum value** should take the value of the deepest depth contour bounding the area.

2. If the deepest depth is shown by a depth contour, and the shallowest depth is shown by a sounding (a shoal):
   - **depth range minimum value** should take the value of the dataset depth contour immediately shallower than the value of the sounding or -H.
   - **depth range maximum value** should take the value of the depth contour.

3. If the deepest depth is shown by a sounding and the shallowest depth is shown by a depth contour (a deep):
   - **depth range minimum value** should take the value of the depth contour.
   - **depth range maximum value** should take the value of the dataset depth contour immediately deeper than or equal to the value of the sounding.

4. If the shallowest depth is defined by the coastline:
   - **depth range minimum value** should take the value of -H.
   - **depth range maximum value** should take the value of the shallowest dataset depth contour bounding the area.

5. If the depth area is bounded by only one depth contour, contains no soundings, and is a shoal:
   - **depth range minimum value** should take the value of the dataset depth contour immediately shallower than the value of the depth contour, or -H.
   - **depth range maximum value** should take the value of the depth contour.

6. If the depth area is bounded by only one depth contour, contains no soundings, and is a deep:
   - **depth range minimum value** should take the value of the depth contour.
   - **depth range maximum value** should take the value of the standard depth contour immediately deeper than the value of the depth contour.

7. If the depth area is bounded by an incomplete depth contour on one side (such as in incompletely surveyed area), and a complete depth contour on the other:
   - This area is optional. See clause X.X above and associated Figure.

8. If the depth area is bounded by complete depth contours, but contains an incomplete (floating) depth contour:
   - **depth range minimum value** should take the value of the shallowest depth contour.
   - **depth range maximum value** should take the value of the deepest depth contour.
   NOTE: This encoding is mandatory whether the optional depth area in paragraph 7 above is encoded or not.

11.7.4   Rivers, canals, lakes, basins

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

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

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

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

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

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

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

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

11.8   Depth – no bottom found

IHO Definition: DEPTH – **NO BOTTOM FOUND**. Upon investigation the bottom was not found at this depth. (Adapted from IHO Dictionary – S-32).

S-101 Geo Feature: Depth – no bottom found

Primitives: Point

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Technique of sounding measurement	(TECSOU)	1 : found by echo-sounder 2 : found by side scan sonar 3 : found by multi-beam 6 : swept by wire-drag 7 : found by LIDAR 8 : swept by vertical acoustic system 9 : found by electromagnetic sensor ~~11 : satellite imagery~~ 13 : swept by side-scan sonar	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
~~Recording date~~	~~(RECDAT)~~	~~ISO 8601:1988~~	~~DA~~	~~0,1~~
~~Recording indication~~	~~(RECIND)~~		~~TE~~	~~0,1~~
~~Source indication~~			~~C~~	~~0,*~~
~~ Authority~~			~~(S) TE~~	~~1,1~~
~~ Nationality~~			~~(S) TE~~	~~1,1~~
~~ ID code~~			~~(S) TE~~	~~0,1~~
~~ Source~~			~~(S) TE~~	~~0,1~~
~~ Source date~~	~~(SORDAT)~~	~~ISO 8601:1988~~	~~(S) DA~~	~~1,1~~

INT 1 Reference: I 13

11.8.1   No bottom found depths (see S-4 – B-412.3)

If it is required to encode a depth that is indicated as having no bottom found at the value shown, it must be done using the feature **Depth – No Bottom Found**.

The geometry of soundings (see clause X.X) and no bottom found depths is held in a 3 dimensional array (latitude, longitude, depth). In the interests of efficiency, multiple no bottom found depths should be encoded in one spatial type, provided that all the spatial and geo feature attributes are common to the group.

As the sounding multiplication factor (CMFZ) for ENC is 100, no bottom found depths may be encoded to two decimal places of a metre.

Remarks:

- No remarks.

Distinction: Depth area; sounding; swept area.

11.9 Areas with inadequate depth information

IHO Definition: **UNSURVEYED AREA**. An area where hydrographic survey data is non-existent. (IHO Dictionary – S-32).

S-101 Geo Feature: Unsurveyed area (UNSARE)

Primitives: Surface

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

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

INT 1 Reference: I 25

11.9.1 Unsurveyed areas (see S-4 – B-418)

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

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

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

Remarks:
- **Unsurveyed Area** features are part of the Skin of the Earth.

11.9.1.1 Satellite imagery as source information

In some areas source information may be limited to shallow water depth information derived from satellite imagery. Where defined depths can be interpolated from satellite imagery (e.g. the drying line, 5 metre or 10 metre depth contours), and little or no reliable source survey information exists in the area, consideration should be given to showing this information in ENCs.

If it is required to encode shoal areas which have been derived from satellite imagery, **Depth Area** and **Depth Contour** features of an appropriate depth range should be used. This should only be done in areas which have not been systematically surveyed. Areas of depth information derived from satellite imagery should be

covered by **Quality of Bathymetric Data** meta features (see clause X.X) having the appropriate value for the attribute **category of zone of confidence** (i.e. *4* (zone of confidence C) or *5* (zone of confidence D)), and having attribute **technique of sounding measurement** populated as *11* (satellite imagery).

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

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

An inadequately surveyed area should be encoded using either an **Unsurveyed Area** feature, within which soundings and contours may be encoded (but not depth areas), or using **Depth Area** features. The attributes **depth range minimum value** and **depth range maximum value** for such depth areas should have explicit values.

The area must also be covered by **Quality of Bathymetric Data** features (see clause X.X), with suitably defined attribute **category of zone of confidence in data** values, usually value *5* (zone of confidence D). Further information may be given using the meta feature **Quality of Survey**, where appropriate.

A cautionary note should also be encoded using a **Caution Area** feature of type surface (see clause X.X).

11.9.3 Bathymetry in areas of minimal depiction of detail on paper charts

Where areas of little or no depth information exist within a specified ENC usage, they should be encoded using one of the following options:

11.9.3.1 Areas of omitted bathymetry

Encoders are advised that when encoding areas of bathymetry from paper charts containing minimal depth detail at scales that correspond to the maximum display scale for the data, to consult larger scale paper charts or maximum display scale ENC datasets and generalise the bathymetry from this data. This is done to ensure that sufficient information is encoded so as not to conflict with larger maximum display scale coverage. The following is the recommended minimum encoding requirement in such cases:

Where larger maximum display scale ENC coverage is available, the larger scale datasets should be examined to determine the shallowest **Depth Area** feature, other than the intertidal area, within the whole of the area. Intertidal areas should then be generalised from the larger maximum display scale coverage, and one **Depth Area** feature may then be created, with attributes **depth range minimum value** and **depth range maximum value** encoded from the values obtained from the larger scale, corresponding to the remaining area of bathymetry.

Where larger maximum display scale coverage does not exist, a single **Depth Area** feature may be created to cover the area of omitted bathymetry. The **depth range minimum value** of the **Depth Area** feature should be set to the shallowest value appropriate to the colour tint that is applied to it (e.g. if blue tint is used for 5-20m areas, the **depth range minimum value** for the area of omitted bathymetry should be set to *5*). The **depth range maximum value** should be set to the shallowest value of the surrounding Skin of the Earth polygons.

In either case, the areas should be covered by a **Caution Area** feature, the boundary of which follows exactly the surrounding Skin of the Earth features (see clause X.X).

Encoders should consider the effect of over-generalising areas of omitted bathymetry on the ECDIS display as the mariner "zooms out" through the ENC display scales.

11.9.3.2 Areas of very simplified bathymetry

In these areas, information relating to bathymetry (e.g. depth contours, dangers, rocky areas, isolated rocks, nature of the seabed, dredged areas, unsurveyed areas) should be individually encoded as normal.

A **Caution Area** feature should be created covering the **Depth Area** features, within the area of simplified bathymetry, in order to encode a cautionary note (see clause X.X).

Distinction:

12 Nature of the Seabed

12.1   Seabed area

<table>
<tr><td colspan="5">IHO Definition: SEABED AREA. The feature of the bottom including the material of which it is composed and its physical characteristics. Also called nature of bottom, character (or characteristics) of the bottom, or quality of the bottom. (IHO Dictionary – S-32).</td></tr>
<tr><td colspan="5">S-101 Geo Feature: Seabed area (SBDARE)</td></tr>
<tr><td colspan="5">Primitives: Point, Curve, Surface</td></tr>
<tr><td colspan="2"><i>Real World</i></td><td colspan="2"><i>Paper Chart Symbol</i></td><td><i>ECDIS Symbol</i></td></tr>
</table>

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Surface quality			C	1,* (ordered)
Nature of surface	(NATSUR)	1 : mud 2 : clay 3 : silt 4 : sand 5 : stone 6 : gravel 7 : pebbles 8 : cobbles 9 : rock 11 : lava 14 : coral 17 : shells 18 : boulder	(S) EN	0,1
Nature of surface – qualifying terms	(NATQUA)	1 : fine 2 : medium 3 : coarse 4 : broken 5 : sticky 6 : soft 7 : stiff 8 : volcanic 9 : calcareous 10 : hard	(S) EN	0,3
Surface layer			(S) IN	0,1
Water level effect	(WATLEV)	3 : always under water/ submerged 4 : covers and uncovers 5 : awash	EN	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1

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

INT 1 Reference: J 1-12, 30-39

12.1.1   Description of the bottom (see S-4 – B-425 to B-427)

The nature (quality) of the seabed (bottom) must be shown in sufficient detail, where known and on the appropriate maximum display scale ENC data, for such purposes as:
- to give some guidance on holding characteristics when anchoring;
- to help in assessing the stability of shoals and to distinguish rocks from unconsolidated material, when navigating in shoal areas;
- to show where vessels may safely take the ground at low water in tidal areas; or
- to give an indication of the nature of the seabed in deeper waters for fishermen and submariners.
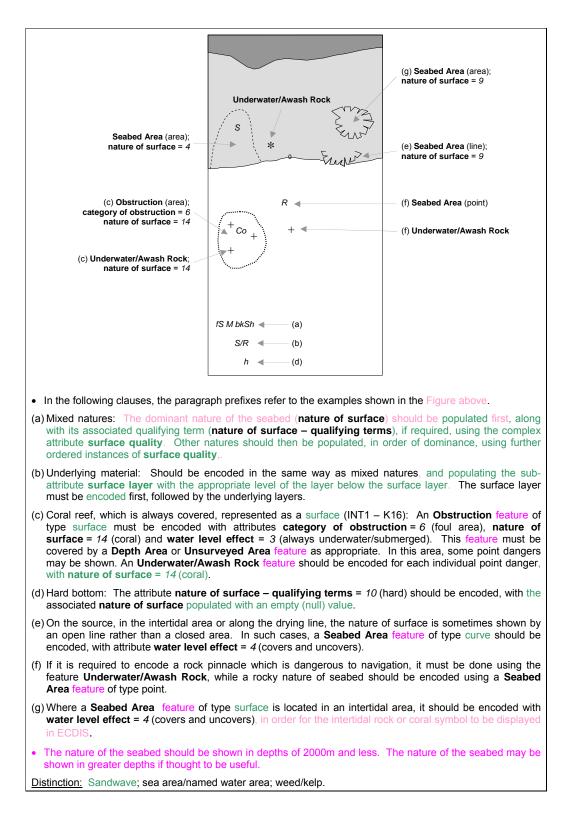
If it is required to encode an area of the sea where the nature of the bottom is homogeneous, it must be done using the feature **Seabed Area**.

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.
- Where the seabed comprises a mixture of material, the complex attribute **surface quality** must be populated as multiple iterations, with the main constituent given first.

Distinction: Pingo; sandwave; weed/kelp.

- In the following clauses, the paragraph prefixes refer to the examples shown in the Figure above.

(a) Mixed natures: The dominant nature of the seabed (**nature of surface**) should be populated first, along with its associated qualifying term (**nature of surface – qualifying terms**), if required, using the complex attribute **surface quality**. Other natures should then be populated, in order of dominance, using further ordered instances of **surface quality**,.

(b) Underlying material: Should be encoded in the same way as mixed natures, and populating the sub-attribute **surface layer** with the appropriate level of the layer below the surface layer. The surface layer must be encoded first, followed by the underlying layers.

(c) Coral reef, which is always covered, represented as a surface (INT1 – K16): An **Obstruction** feature of type surface must be encoded with attributes **category of obstruction** = 6 (foul area), **nature of surface** = 14 (coral) and **water level effect** = 3 (always underwater/submerged). This feature must be covered by a **Depth Area** or **Unsurveyed Area** feature as appropriate. In this area, some point dangers may be shown. An **Underwater/Awash Rock** feature should be encoded for each individual point danger, with **nature of surface** = 14 (coral).

(d) Hard bottom: The attribute **nature of surface – qualifying terms** = 10 (hard) should be encoded, with the associated **nature of surface** populated with an empty (null) value.

(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 **Seabed Area** feature of type curve should be encoded, with attribute **water level effect** = 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 **Underwater/Awash Rock**, while a rocky nature of seabed should be encoded using a **Seabed Area** feature of type point.

(g) Where a **Seabed Area** feature of type surface is located in an intertidal area, it should be encoded with **water level effect** = 4 (covers and uncovers), in order for the intertidal rock or coral symbol to be displayed in ECDIS.

- The nature of the seabed should be shown in depths of 2000m and less. The nature of the seabed may be shown in greater depths if thought to be useful.

Distinction: Sandwave; 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 of usually large, blade-shaped or vine-like brown algae. (IHO Dictionary – S-32).

__S-101 Geo Feature:__ **Weed/kelp (WEDKLP)**

__Primitives:__ Point, Surface

Real World	Paper Chart Symbol	ECDIS Symbol

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

INT 1 Reference: J 13.1, 13.2

12.2.1   Weed - Kelp (see S-4 – B-428.2)

If it is required to encode marine weed or kelp, it must be done using the feature **Weed/Kelp**.

Remarks:
• For the mariner, the presence of kelp is also generally an indication of the presence of submerged rocks.

Distinction:	Seabed area; vegetation.

12.3   Sandwaves

IHO Definition: **SANDWAVE**. Large mobile wave-like sediment feature in shallow water and composed of sand. The wave length may reach 100 metres; the amplitude may be up to 20 metres. Also sand-wave or sand wave. Sometimes called a mega-ripple. (IHO Dictionary – S-32).

S-101 Geo Feature: Sandwave (SNDWAV)

Primitives: Point, Curve, Surface

Real World	Paper Chart Symbol	ECDIS Symbol

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

INT 1 Reference: J 14

12.3.1   Sandwaves (see S-4 – B-428.1)

Sandwave areas may be dangerous to mariners, as the depth may be less than charted, because surveys are not necessarily conducted at the ideal time for sandwave building. Some research has shown that sandwave mobility is most evident in the vertical plane and high spots may occur on crest lines in response to calm weather, and possibly during particular times within the tidal cycle. It is therefore important to warn the mariner of the presence of sandwaves, and provide them with as much information as is available and can be included in the ENC.

If it is required to encode sandwaves, this must be done using the feature **Sandwave**.

Remarks:
- The attribute **vertical length** is used to populate the amplitude of the sandwave above the seafloor, where known.
- Care must be taken not to over-generalize depth depiction in sandwave areas, as the typically convoluted contour pattern, and significant depth changes between soundings selected from crests and troughs, help to draw attention to these features. However, this will not usually be sufficient warning, as the variance between crest and trough may fall between standard contours, or the maximum display scale for the ENC data may be insufficient to show the sandwaves individually, or anything but the shoalest soundings. Attention should therefore be drawn to the area by encoding a **Sandwave** feature. If considered necessary, the nature of any navigational hazard presented by the sandwaves may be incorporated using the complex

attribute **information** or a note referenced by the complex attribute **textual description**.

- Where frequently repeated surveys show variations in least depth, the shoalest soundings obtained over a period of years should be encoded. This blending of details from surveys of differing dates must be done with care; in particular, long-term deepening must not be overlooked.

<u>Distinction:</u> 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).

S-101 Geo Feature: Spring (SPRING)

Primitives: Point

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

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

INT 1 Reference: J 15

12.4.1 Springs in the seabed (see S-4 – B-428.3)

Springs in the seabed may cause false echo-soundings. If it is required to encode a spring in the seabed, it must be done using the feature **Spring**.
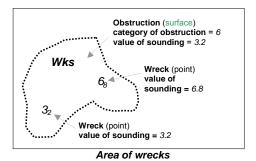
Remarks:
- No remarks.

Distinction:

13 Rocks, Wrecks, Foul Ground, Obstructions

Full details of all dangers to navigation must be encoded except in those areas for which the ENC is clearly inappropriate for navigation. The fullest possible information on clearance depths must be given irrespective of their depths, in preference to making any arbitrary distinction between "dangerous" and "non-dangerous" depths. This will allow navigators of all classes of vessels, including deep-draught ships and submarines, to make their own assessments of what is dangerous to them.

13.1 Danger line limiting an area of wrecks or obstructions

Area of wrecks

The area enclosed by the danger line must be encoded using **Wreck** (see clause X.X) or **Obstruction** (see clause X.X) features of type surface, with the attribute values, when encoded, reflecting the characteristics of the shallowest point feature encoded in the area. The area must also be covered by **Depth Area** or **Unsurveyed Area** features as appropriate.

If it is required to encode one or more least depths in such an area, it must be done using a point feature for each of the depths, in addition to the surface feature.

13.2 Danger line bordering an area through which navigation is not safe (see S-4 – B-420.1)

A danger line, bordering an area through which navigation is not safe, should be encoded using an **Obstruction** feature of type surface, with attribute **category of obstruction** = 6 (foul area).

13.3 Doubtful dangers (see S-4 – B-424)

The fact that a danger is doubtful should be encoded using the feature attributes **quality of sounding measurement** and **status** and the spatial attribute **quality of position** for the feature:

	S-4	INT 1	quality of position	quality of sounding measurement	status
Position approximate	B-424.1	B7	4		
Position doubtful	B-424.2	B8	5		
Existence doubtful	B-424.3	I1			18
Doubtful sounding	B-424.4	I2		3	
Reported danger	B-424.5	I3.1, 3.2	7 or 8	8 or 9	

Remarks:
- The same notions of approximate or doubtful positions and doubtful existence also apply to features other than dangers (e.g. landmarks, buoys).
- The text "Discoloured water" on the source indicates the probable existence of shallow water. This must be encoded, where required, using a **Discoloured Water** feature (see clause X.X).

13.4 Rocks (intertidal/awash/submerged)

IHO Definition: **UNDERWATER/AWASH ROCK**. A concreted mass of stony material or coral which dries, is awash or is below the water surface. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.194, November 2000).
S-101 Geo Feature: Underwater/awash rock (UWTROC)
Primitives: Point

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Exposition of sounding	(EXPSOU)	1 : within the range of depth of the surrounding depth area 2 : shoaler than the range of depth of the surrounding depth area 3 : deeper than the range of depth of the surrounding depth area	EN	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Quality of sounding measurement	(QUASOU)	1 : depth known 2 : depth or least depth unknown 3 : doubtful sounding 4 : unreliable sounding 6 : least depth known 7 : least depth unknown, safe clearance at value shown 8 : value reported (not surveyed) 9 : value reported (not confirmed)	EN	0,*
Reported date		ISO 8601:1988	DA	0,1
Sounding uncertainty	(SOUACC)		RE	0,1
Status	(STATUS)	18 : existence doubtful	EN	0,1
Surface quality			C	0,1
Nature of surface	(NATSUR)	9 : rock 14 : coral 18 : boulder	(S) EN	1,1
Nature of surface – qualifying terms	(NATQUA)	4 : broken 6 : soft 7 : stiff 8 : volcanic 9 : calcareous	(S) EN	0,1

Comment [j58]: MD8 – 4.Co.11 and 4.Cl.9.

		10 : hard		
Surface layer			(S) IN	0,0

Technique of sounding measurement	(TECSOU)	1 : found by echo-sounder
		2 : found by side scan sonar
		3 : found by multi-beam
		4 : found by diver
		5 : found by lead-line
		6 : swept by wire-drag
		7 : found by laser
		8 : swept by vertical
		   acoustic system
		9 : found by
		   electromagnetic sensor
		10 : photogrammetry
		11 : satellite imagery
		12 : found by leveling
		13 : swept by side-scan
		   sonar
			EN	0,*

Value of sounding	(VALSOU)		RE	0,1
Water level effect	(WATLEV)	3 : always under water/ submerged 4 : covers and uncovers 5 : awash	EN	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
~~Recording date~~	~~(RECDAT)~~	~~ISO 8601:1988~~	~~DA~~	~~0,1~~
~~Recording indication~~	~~(RECIND)~~		~~TE~~	~~0,1~~
~~Source indication~~			~~C~~	~~0,*~~
~~ Authority~~			~~(S) TE~~	~~1,1~~
~~ Nationality~~			~~(S) TE~~	~~1,1~~
~~ ID code~~			~~(S) TE~~	~~0,1~~
~~ Source~~			~~(S) TE~~	~~0,1~~
~~ Source date~~	~~(SORDAT)~~	~~ISO 8601:1988~~	~~(S) DA~~	~~1,1~~

<u>INT 1 Reference:</u> K 11-15

13.4.1 Rocks which may cover (see S-4 – B-421.2 to B-421.4)

Full details of all dangers to navigation must be encoded except in those areas for which the ENC is clearly inappropriate for navigation (see S-4 – B-401 and B-402). The fullest possible information on clearance depths must be given irrespective of their depths, where known, in preference to making any arbitrary distinction between "dangerous" and "non-dangerous" depths. This will allow navigators of all classes of vessels, including deep-draught ships and submarines, to make their own assessments of what is dangerous to them.

Underwater rocks may cover and uncover, may be awash, or may be always underwater.

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

Rock or coral reef	INT 1	water level effect	quality of sounding measurement	Comment

Covers and uncovers, depth unknown	K11	*4*	*2 or* *<undefined>*	See Remarks below for population of the attribute **exposition of sounding**.
Covers and uncovers, depth known	K11	*4*	any value except *2*; or <undefined>	Negative value for **value of sounding**
Awash	K12	*5*		
Underwater rock, depth unknown	K13	*3*	*2 or* *<undefined>*	See Remarks below for population of the attribute **exposition of sounding**.
Underwater rock, depth known	K14	*3*	any value except *2*; or <undefined>	
Reported, not confirmed	I3.1,3.2	*3,4* or *5*	*9*	If available, the year reported should be encoded in **reported** date. The attribute **quality of position** should be set to *8* (reported, not confirmed).

Comment [j59]: S-58 Check 1657.

Remarks:
- For rocks which do not cover (islets), see clause X.X.
- All **Underwater/Awash Rock** features should be encoded using one of the above combinations of attributes.
- For guidance regarding the population of the attribute **sounding uncertainty**, see clause X.X (**Quality of Bathymetric Data**).
- A rock represented by a spot sounding and an associated nature of seabed (underwater rock not dangerous to surface navigation) should be encoded using a single **Underwater/Awash Rock** feature, with the sounding value encoded using the attribute **value of sounding**. Where **Underwater/Awash Rock** is encoded, there must be no **Sounding** feature encoded coincident.
- For area rock and coral reef features, see clause X.X.
- When a group of rocks is surrounded by a danger line, each rock should be encoded as a separate **Underwater/Awash Rock** feature covered by an obstruction area feature (**Obstruction** – see clause X.X).
- If it is required to encode an **Underwater Rock** feature where the attribute **value of sounding** is populated with an empty (null) value, but the source information indicates the depth of the feature is within the range of the surrounding depth area, the value **exposition of sounding** = *1* (within the range of the surrounding depth area) must be populated in order to avoid the unnecessary display of isolated danger symbols in ECDIS.

Distinction: Obstruction; seabed area; sounding; wreck.

13.5   Wrecks

IHO Definition: **WRECK**. The ruined remains of a stranded or sunken vessel which has been rendered useless. (IHO Dictionary – S-32).	

S-101 Geo Feature: Wreck (WRECKS)

Primitives: Point, Surface

Real World	_Paper Chart Symbol_	_ECDIS Symbol_

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of wreck	(CATWRK)	1 : non-dangerous wreck 2 : dangerous wreck 3 : distributed remains of wreck 4 : wreck showing mast/masts 5 : wreck showing any portion of hull or superstructure	EN	0,1
Exposition of sounding	(EXPSOU)	1 : within the range of depth of the surrounding depth area 2 : shoaler than the range of depth of the surrounding depth area 3 : deeper than the range of depth of the surrounding depth area	EN	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
Quality of sounding measurement	(QUASOU)	1 : depth known 2 : depth or least depth unknown 3 : doubtful sounding 4 : unreliable sounding 6 : least depth known 7 : least depth unknown, safe clearance at value shown 8 : value reported (not surveyed) 9 : value reported (not confirmed)	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Reported date		ISO 8601:1988	DA	0,1
Sounding uncertainty	(SOUACC)		RE	0,1

Comment [j60]: MD8 – 4.Co.11 and 4.Cl.9.

Status	(STATUS)	7 : temporary 13 : historic 18 : existence doubtful	EN	0,*

Technique of sounding measurement	(TECSOU)	1 : found by echo-sounder
		2 : found by side scan sonar
		3 : found by multi-beam
		4 : found by diver
		5 : found by lead-line
		6 : swept by wire-drag
		7 : found by laser
		8 : swept by vertical
		   acoustic system
		9 : found by
		   electromagnetic sensor
		10 : photogrammetry
		11 : satellite imagery
		12 : found by leveling
		13 : swept by side-scan
		   sonar
			EN	0,*

Value of sounding	(VALSOU)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1

Water level effect	(WATLEV)	1 : partly submerged at high
		   water
		2 : always dry
		3 : always under water/
		   submerged
		4 : covers and uncovers
		5 : awash
			EN	1,1

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

INT 1 Reference: K 20-31

13.5.1   Wrecks (see S-4 – B-422, B-422.1 to B-422.8)

Wrecks must be encoded to whatever depth they are considered to be of interest, also taking account of the needs of submarines and fishing vessels where appropriate, but not generally in water deeper than 2000m. (Trawling regularly takes place in depths of 400m and occasionally in depths as great as 2000m).

Population of the attributes **category of wreck**, **quality of sounding measurement**, **technique of sounding measurement** and **water level effect** are described in the Table below.

In the following table, the symbol '/' indicates that this attribute must not be encoded. A blank indicates that the encoder may choose a relevant value for the attribute.

Wrecks…	S-4	INT 1	category of wreck	water level effect	quality of sounding measurement	technique of sounding measurement
Showing any part of hull or superstructure	B-422.2	K24 K20	5	1,2 or 4	/	/
Covers and uncovers	B-422.2	K24 K21	4 or 5	4		
Awash				5		
The mast only is visible at high water	B-422.2	K25	4 or 5	2	/	/
The mast only is visible at low water	B-422.2	K25	4	4		
Measured depth	B-422.4	K26		3	1, 6 or <undefined>	
Depth measured and swept by wire drag	B-422.3	K27		3	6	6
Depth measured by diver	B-422.3	K27		3	1 or 6	4
Depth unknown, considered dangerous by the responsible producing authority	B-422.6	K28	2	3	2* or <undefined>	/
Depth unknown, not considered dangerous by the responsible producing authority	B-422.6	K29	1	3	2* or <undefined>	/
Depth unknown, with a safe clearance	B-422.5	K30		3	7	/
Distributed remains of wreck	B-422.8	K31	3			
Reported, not confirmed	B-424.5	I3.1 I3.2			9	

All wrecks should be encoded using one of the above combinations of attributes.

* For a wreck where the least depth is unknown, the attribute value *2* (depth or least depth unknown) for **quality of sounding measurement** does not apply to the depth of the sea bottom near the wreck.

The comment box:

Comment [j61]: MD8 – 4.Cl.9.

The provision of more quantitative information for wrecks where possible is particularly important in terms of the portrayal of wrecks in ECDIS. Conditional Symbology Procedures in the IHO Specifications for Chart Content and Display Aspects of ECDIS (S-52) Annex A – ECDIS Presentation Library, do not take into account the classification of wrecks as "dangerous" or "non-dangerous" when symbolising. This often results in wrecks being symbolised as an obstruction to navigation where they are actually non-dangerous. Where the depth of the wreck is unknown, compilers should consider determining an estimated safe clearance value (see S-4 – B-422.5) and populating **quality of sounding measurement** = *7* (least depth unknown, safe clearance at value shown).

Remarks:
- A **Wreck** feature of type surface must be covered by a surface feature from Skin of the Earth as appropriate.
- At least one of the attributes **category of wreck** or **value of sounding measurement** must be populated.
- The attribute **height** is only relevant for wrecks having attribute **water level effect** = *1* (partly submerged at high water) or *2* (always dry).
- For guidance regarding the population of the attribute **sounding uncertainty**, see clause X.X (**Quality of Bathymetric Data**).
- For reported, not confirmed wrecks, the date of the report must be populated, where known, using the attribute **reported date**.
- When encoding a **Wreck** feature, the attributes populated should adhere to the guidance in S-4 Clause B-422. Where possible, this includes the population of the attributes **value of sounding** and **quality of sounding measurement** where the depth of a wreck is known, or the depth is unknown but an estimated safe clearance can been determined. Where the depth is known, or the depth is unknown but an estimated safe clearance has been determined, it is not required to populate the attribute **category of wreck** = *1* (non-dangerous wreck) or *2* (dangerous wreck), as the mariner has the quantitative information in order to determine whether the wreck may be dangerous to their type of vessel.
- If it is required to encode a **Wreck** feature where the attribute **value of sounding** is not populated or is populated with an empty (null) value, but the source information indicates the depth of the feature is within the range of the surrounding depth area, the value **exposition of sounding** = *1* (within the range of the

surrounding depth area) must be populated in order to avoid the unnecessary display of isolated danger symbols in ECDIS.

- For wrecks visible or partly visible at sounding datum, the height or drying height should be encoded, if known. This helps to distinguish wrecks which are always visible from wrecks which are only visible at low tide.

13.5.1.1 Where a wreck is shown with its true shape (large scale ENCs) (see S-4 – B-422.1)

Soundings and heights are often given inside a wreck to show the highest points of the hull or superstructure (e.g. mast, funnel). If it is required to encode such features, they must be done using:

- A **Wreck** feature of type surface with all populated attributes applying to the highest point of the wreck.
- **Land Elevation** features of type point to encode the features of the wreck that are always dry; the type of each feature (e.g. mast, funnel) may be encoded using the complex attribute **information**.
- **Sounding** features to encode the features of wrecks which are always submerged, or cover and uncover; the type of each feature (e.g. mast, funnel) may be encoded using **information**, which means that these soundings must be encoded individually.

13.5.1.2 Changing criteria for wrecks

Historically the criteria used for differentiating between "dangerous" and "non-dangerous" wrecks were often based on a threshold value for the estimated depth over the wreck (e.g. 20m, 28m). Criteria have varied between nations and over time (due to the increasing draught of large vessels). The term "non-dangerous wreck" may be applied even though a wreck may be dangerous to some vessels capable of navigating in the vicinity. Unfortunately, the mariner is not necessarily aware of that fact or that, due to the changing criteria, wrecks encoded as "non-dangerous" may have different meanings. Ideally, therefore, all encoded "dangerous" and "non-dangerous" wrecks having no known depth should be re-assessed to conform to the guidance provided in S-4 – B-422.

13.5.2 Historic wrecks (see S-4 – B-449.5)

Many nations have designated areas around certain wrecks of historical or cultural (e.g. sea graves) importance to protect the wrecks from unauthorised interference (e.g. by diving, salvage or anchoring). Such areas should be encoded on the largest maximum display scale ENC data covering the wreck.

If it is required to encode a restricted area around a historic wreck, it must be done using a **Restricted Area** feature (see clause X.X), with attribute **category of restricted area** = *10* (historic wreck area).

In addition, the wreck itself should be encoded as a **Wreck** feature, with attribute **status** = *13* (historic).

Distinction: Depth area; hulk; obstruction; sounding; underwater/awash rock.

13.6 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, such as a sunken rock or pinnacle. (IHO Dictionary – S-32).

S-101 Geo Feature: Obstruction (OBSTRN)

Primitives: Point, Curve, Surface

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of obstruction	(CATOBS)	1 : snag/stump 2 : wellhead 3 : diffuser 4 : crib 5 : fish haven 6 : foul area 8 : ice boom 9 : ground tackle 10 : boom 11 : underwater turbine 12 : wave energy device 13 : fish aggregating device (FAD) 14 : ocean data acquisition system (ODAS) 15 : artificial reef 16 : template 17 : manifold	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Exposition of sounding	(EXPSOU)	1 : within the range of depth of the surrounding depth area 2 : shoaler than the range of depth of the surrounding depth area 3 : deeper than the range of depth of the surrounding depth area	EN	0,1
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
Product	(PRODCT)	1 : oil 2 : gas 3 : water 8 : drinking water	EN	0,*

		23 : electricity		
Quality of sounding measurement	(QUASOU)	1 : depth known 2 : depth or least depth unknown 3 : doubtful sounding 4 : unreliable sounding 6 : least depth known 7 : least depth unknown, safe clearance at value shown 8 : value reported (not surveyed) 9 : value reported (not confirmed)	EN	0,*
Reported date		ISO 8601:1988	DA	0,1
Sounding uncertainty	(SOUACC)		RE	0,1
Status	(STATUS)	1 : permanent 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 13 : historic 18 : existence doubtful 19 : buoyed	EN	0,*
Surface quality			C	0,* (ordered)
Nature of surface	(NATSUR)	1 : mud 2 : clay 3 : silt 4 : sand 5 : stone 6 : gravel 7 : pebbles 8 : cobbles 9 : rock 11 : lava 14 : coral 17 : shells 18 : boulder	(S) EN	1,1
Nature of surface – qualifying terms	(NATQUA)	1 : fine 2 : medium 3 : coarse 4 : broken 5 : sticky 6 : soft 7 : stiff 8 : volcanic 9 : calcareous 10 : hard	(S) EN	0,1
Surface layer			(S) IN	0,0
Technique of sounding measurement	(TECSOU)	1 : found by echo-sounder 2 : found by side scan sonar 3 : found by multi-beam 4 : found by diver 5 : found by lead-line 6 : swept by wire-drag 7 : found by laser 8 : swept by vertical acoustic system 9 : found by electromagnetic sensor 10 : photogrammetry 11 : satellite imagery 12 : found by leveling 13 : swept by side-scan	EN	0,*

Comment [j62]: MD8 – 4.Co.11 and 4.Cl.9.

Comment [j63]: S-57 Extension 06/01.

Comment [A64]: Do not consider that this is needed for **Obstruction**.

		sonar		
Value of sounding	(VALSOU)		RE	0,1
Vertical length	(VERLEN)		RE	0,1
Water level effect	(WATLEV)	1 : partly submerged at high water 2 : always dry 3 : always under water/ submerged 4 : covers and uncovers 5 : awash 7 : floating	EN	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
~~Recording date~~	~~(RECDAT)~~	~~ISO 8601:1988~~	~~DA~~	~~0,1~~
~~Recording indication~~	~~(RECIND)~~		~~TE~~	~~0,1~~
~~Source indication~~			~~C~~	~~0,*~~
~~Authority~~			~~(S) TE~~	~~1,1~~
~~Nationality~~			~~(S) TE~~	~~1,1~~
~~ID code~~			~~(S) TE~~	~~0,1~~
~~Source~~			~~(S) TE~~	~~0,1~~
~~Source date~~	~~(SORDAT)~~	~~ISO 8601:1988~~	~~(S) DA~~	~~1,1~~

INT 1 Reference: K 1, 31, 40-43, 46; L 21, 23; Q 42

13.6.1   Obstructions and foul areas (see S-4 – B-327.5, B-420.1, B-422.8-9, B-431.6, B-445.1 and B-447.5, B-447.7)

If it is required to encode snags, stumps, wellheads, diffusers, cribs, fish havens, foul areas, booms, ice booms, sites of cleared platforms, ground tackle, wave energy devices, underwater turbines, fish aggregating devices, ocean data acquisition systems, or artificial reefs, it must be done using the feature **Obstruction**.

> **Comment [j65]:** This sentence is becoming very convoluted. Is there a better way of describing this?

Population of the attributes **quality of sounding measurement**, **technique of sounding measurement** and **water level effect** are described in the Table below.

In the following table, the symbol '/' indicates that this attribute must not be encoded. A blank indicates that the encoder may choose a relevant value for the attribute.

Obstruction...	INT 1	water level effect	quality of sounding measurement	technique of sounding measurement
Depth unknown	K40	3 or 4	2* or <undefined>	/
Least depth known	K41	3 or 4	1 or 6	
Swept by wire to the depth shown	K42	3	6	6
Measured by diver	K42	3	1 or 6	4
Floating (e.g. FAD or ODAS buoy)	Q58	7	/	/

All obstructions should be encoded using one of the above combinations of attributes.

* For an obstruction where the least depth is unknown, the attribute value *2* (depth or least depth unknown) for **quality of sounding measurement** does not apply to the depth of the sea bottom near the obstruction.

It is important when encoding obstructions to be aware of the distinction between attribute value **category of obstruction** = *6* (foul area) and foul ground:

Foul areas are defined as areas of numerous uncharted dangers to navigation, and on paper charts this is represented using a danger line (see clause X.X and INT1 – K1), normally supported by shallow water blue tint and little, if any, additional depth information covering the area. When encoded on ENC, **Obstruction** features of type area with attribute **category of obstruction** = *6* (foul area) will display in the ECDIS "base display" as an obstruction to navigation, with all associated alarms to indicate that it is unsafe for vessels to enter or transit the area.

Foul ground is defined as an area over which it is safe to navigate but which should be avoided for anchoring, taking the ground or ground fishing. On paper charts, this is represented using the maritime limit in general dashed black line, interspersed with foul ground "hash" symbols, or with an accompanying legend "*Foul*" (see INT1 – K31). The area is also covered by appropriate full depth representation. In some cases, the legend shown on the paper chart is expanded to "*Foul Ground*" or "*Foul Area*". When encoded on ENC, **Foul Ground** features (see clause X.X) of type area will display in the ECDIS "other" display as a "foul area of seabed safe for navigation but not for anchoring", indicating to the mariner that it is safe to enter or transit the area but hazardous to take the ground or undertake other subsurface activities.

In some cases the use of the paper chart legend "*Foul Area*" to indicate an area of foul ground has resulted in encoding in ENC of **Obstruction** with CATOBS = *6* (foul area). This encoding has resulted in the incorrect indication in the ECDIS that the area is unsafe for navigation, which is potentially confusing to the mariner.

Foul ground, over which it is safe to navigate but which should be avoided for anchoring, taking the ground or ground fishing, should be encoded using a **Foul Ground** feature of type surface or point. Although the paper chart may depict a "Foul Area", it should be determined whether it is in fact "Foul Ground" before encoding the appropriate feature.

Remarks:
- The minimum depth or maximum authorised draught, if known, over any obstruction, must be encoded using the attribute **value of sounding**.
- The attribute **height** must be populated for **Obstruction** features having attribute **water level effect** = *1* (partly submerged at high water) or *2* (always dry).
- The attribute **product** is only relevant for wellheads (**category of obstruction** = *2*).
- The attribute **vertical length** is used to populate the distance of the obstruction above the seabed.
- For guidance regarding the population of the attribute **sounding uncertainty**, see clause X.X (**Quality of Bathymetric Data**).
- For reported, not confirmed obstructions, the date of the report must be populated, where known, using the attribute **reported date**.
- If the nature of a dangerous underwater feature, dangerous underwater area, or floating feature is not explicitly known, it must be encoded using **Obstruction**.
- An **Obstruction** feature of type surface must be covered by a surface feature from Skin of the Earth as appropriate.
- An area containing numerous dangers, through which navigation is not safe at the maximum display scale for the ENC data, should be encoded using an **Obstruction** feature of type surface, with attribute **category of obstruction** = *6* (foul area).
- If it is required to encode an **Obstruction** feature where the attribute **value of sounding** is populated with an empty (null) value, but the source information indicates the depth of the feature is within the range of the surrounding depth area, the value **exposition of sounding** = *1* (within the range of the surrounding depth area) must be populated in order to avoid the unnecessary display of isolated danger symbols in ECDIS.
- A danger circle on a paper chart that surrounds a single symbol or sounding (e.g. INT1 – K26, K27, K40(b) or K41 to K43.1) must not be encoded as a separate surface. However, when a danger line indicates the true shape of the feature, it should be encoded using **Wreck** or **Obstruction** features of type surface. A single sounding enclosed by a danger circle on medium and large scale paper charts must be encoded using an **Obstruction** feature of type point. The sounding value, in this case, must be encoded using the attribute **value of sounding**. Soundings enclosed by a danger circle on small scale paper charts may indicate a reported, not confirmed sounding, and such soundings should be evaluated to determine whether they should be encoded as **Obstruction** features, or **Sounding** features (see clause X.X) with attribute QUAOU = *9* (value reported (not confirmed))).
- Platforms which have been cut-off above the seabed must be encoded as **Obstruction**, while platforms which have been cut-off to the level of the seabed should be encoded as **Foul Ground** (see clause X,X).
- In certain circumstances where an obstruction is always dry (e.g. cribs), it may be covered by a **Land Area** feature.
- Underwater Fish Aggregating Devices (FAD), whether under water or floating, must be encoded as **Obstruction** with **category of obstruction** = *13* (fish aggregating device (FAD)), unless the FAD is a

vessel that has been deliberately sunk to form a fish haven, which should be encoded as a **Wreck** feature (see clause X.X).

Distinction: Depth area; fishing facility; foul ground; marine farm/culture; underwater/awash rock; water turbulence; wreck.

13.7   Foul ground

IHO Definition: **FOUL GROUND**. Areas over which it is safe to navigate but which should be avoided for anchoring, taking the ground or ground fishing. (IHO Dictionary – S-32).
S-101 Geo Feature: Foul ground
Primitives: Point, ~~Curve,~~ Surface

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Quality of sounding measurement	(QUASOU)	1 : depth known 2 : depth or least depth unknown 3 : doubtful sounding 4 : unreliable sounding 6 : least depth known 7 : least depth unknown, safe clearance at value shown 8 : value reported (not surveyed) 9 : value reported (not confirmed)	EN	0,*
Reported date		ISO 8601:1988	DA	0,1
Sounding uncertainty	(SOUACC)		RE	0,1
Status	(STATUS)	1 : permanent 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 13 : historic 18 : existence doubtful 19 : buoyed	EN	0,*
Technique of sounding measurement	(TECSOU)	1 : found by echo-sounder 2 : found by side scan sonar 3 : found by multi-beam 4 : found by diver 5 : found by lead-line 6 : swept by wire-drag 7 : found by laser 8 : swept by vertical acoustic system 9 : found by electromagnetic sensor 10 : photogrammetry 11 : satellite imagery 12 : found by leveling	EN	0,*

Comment [j66]: MD8 – 4.Co.11 and 4.Cl.9.

Comment [j67]: S-57 Extension 06/01.

		13 : swept by side-scan sonar		
Value of sounding	(VALSOU)		RE	0,1
Water level effect	(WATLEV)	~~1 : partly submerged at high water~~ ~~2 : always dry~~ 3 : always under water / submerged 4 : covers and uncovers 5 : awash ~~6 : subject to inundation or flooding~~	EN	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
~~Recording date~~	~~(RECDAT)~~	~~ISO 8601:1988~~	~~DA~~	~~0,1~~
~~Recording indication~~	~~(RECIND)~~		~~TE~~	~~0,1~~
~~Source indication~~			~~C~~	~~0,*~~
~~ Authority~~			~~(S) TE~~	~~1,1~~
~~ Nationality~~			~~(S) TE~~	~~1,1~~
~~ ID code~~			~~(S) TE~~	~~0,1~~
~~ Source~~			~~(S) TE~~	~~0,1~~
~~ Source date~~	~~(SORDAT)~~	~~ISO 8601:1988~~	~~(S) DA~~	~~1,1~~

INT 1 Reference:

13.7.1 Foul ground (see S-4 – B-422.8)

If it is required to encode an area over which it is safe to navigate for surface vessels, but where seabed operations are unsafe, it should be done using the feature **Foul Ground**. Such areas are distinct from the feature **Obstruction**, category of obstruction **foul area**, where navigation is considered to be unsafe for surface vessels.

Population of the attributes **quality of sounding measurement** and **technique of sounding measurement** are described in the Table below.

In the following table, the symbol '/' indicates that this attribute must not be encoded. A blank indicates that the encoder may choose a relevant value for the attribute.

Foul Ground...	INT 1	water level effect	quality of sounding measurement	technique of sounding measurement
Depth unknown	K40	*3* or *4*	*2** or *<undefined>*	/
Least depth known	K41	*3* or *4*	*1* or *6*	
Swept by wire to the depth shown	K42	*3*	*6*	*6*
Measured by diver	K42	*3*	*1* or *6*	*4*

All foul ground should be encoded using one of the above combinations of attributes.

* For foul ground where the least depth is unknown, the attribute value *2* (depth or least depth unknown) for **quality of sounding measurement** does not apply to the depth of the sea bottom near the foul ground.

- The minimum depth or maximum authorised draught, if known, over any foul ground, must be encoded using the attribute **value of sounding**.
- For guidance regarding the population of the attribute **sounding uncertainty**, see clause X.X (**Quality of Bathymetric Data**).
- For reported, not confirmed foul ground, the date of the report must be populated, where known, using the attribute **reported date**.
- A **Foul Ground** feature of type surface must be covered by a surface feature from Skin of the Earth as appropriate.
- Platforms which have been cut-off to the level of the seabed should be encoded as **Foul Ground**, while platforms which have been cut-off above the seabed must be encoded as **Obstruction** (see clause X,X).
- The distributed remains of wrecks must be encoded using the feature **Wreck**, and must not be encoded as **Foul Ground**.

Distinction: Depth area; fishing facility; marine farm/culture; obstruction; seabed area; underwater/awash rock; water turbulence; wreck.

13.8   Discoloured water

IHO Definition: **DISCOLOURED WATER**. Unnatural coloured areas in the sea which may or may not indicate the existence of shoals. (NOAA – Nautical Chart Manual, Volume 1).	

S-101 Geo Feature: Discoloured water

Primitives: Point, Surface

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Reported date		ISO 8601:1988	DA	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1

INT 1 Reference:

13.8.1   Discoloured water (see S-4 – B-424.6)

If it is required to encode the possible existence of shoal water as indicated by an area of discoloured water, it must be done using the feature **Discoloured Water**.

Remarks:
- The feature **Discoloured Water** must only be used to indicate an area of possible shoal water where an observation of the discolouration has been made and there is no supporting bathymetric data to support the possible shoaling.
- A **Discoloured Water** feature must be covered by **Depth Area** or **Unsurveyed Area** features.

Distinction: Caution area; obstruction; underwater rock; wreck.

13.9   Fishing facility

IHO Definition: **FISHING FACILITY**.   A structure ~~in shallow water~~ for fishing purposes which can be an obstruction to ships in general. The position of these structures may vary frequently over time. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.70, November 2000, as amended).

S-101 Geo Feature: Fishing facility (FSHFAC)

Primitives: Point, Curve, Surface

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of fishing facility	(CATFIF)	1 : fishing stake 2 : fish trap 3 : fish weir 4 : tunny net	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Status	(STATUS)	1 : permanent 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 12 : illuminated 16 : watched 17 : un-watched 19 : buoyed	EN	0,*
Vertical length	(VERLEN)		RE	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1

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

INT 1 Reference: K 44, 45

13.9.1   Fishing facilities (see S-4 – B-447 and B-447.1-3)

Fishing facilities are usually sited in shallow water, but tunny nets are often located in deeper water. They can be very large and extend up to several miles offshore; and form an obstruction to navigation.

If it is required to encode a fishing facility it must be done using the feature **Fishing Facility**.

Remarks:
- The attribute **vertical length** is used to populate the distance of the facility above the seabed.
- Certain types of fishing facilities such as tunny nets in deep water may be an obstruction to navigation. If **Fishing Facility** features are considered to be an obstruction or hazard to navigation, they should also be encoded with an **Obstruction** feature. Although this is contrary to ENC encoding principles (i.e. double encoding), this solution is recommended for portraying dangers to navigation of this nature in the ECDIS.
- Fish aggregating devices (FAD), whether under water or floating, must be encoded, where required, as **Obstruction** features (see clause X.X).

Distinction: Marine farm/culture; obstruction.

13.10 Marine farm/culture

IHO Definition: **MARINE FARM/CULTURE**. An assemblage of cages, nets, rafts and floats or posts where fish, including shellfish, are artificially cultivated. Also called fish farm. (IHO Dictionary – S-32).

S-101 Geo Feature: Marine farm/culture (MARCUL)

Primitives: Point, Curve, Surface

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Category of marine farm/culture	(CATMFA)	1 : crustaceans 2 : edible bivalve molluscs 3 : fish 4 : seaweed 5 : pearl culture farm	EN	0,1
Exposition of sounding	(EXPSOU)	1 : within the range of depth of the surrounding depth area 2 : shoaler than the range of depth of the surrounding depth area 3 : deeper than the range of depth of the surrounding depth area	EN	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Quality of sounding measurement	(QUASOU)	1 : depth known 2 : depth or least depth unknown 3 : doubtful sounding 4 : unreliable sounding 6 : least depth known 7 : least depth unknown, safe clearance at value shown 8 : value reported (not surveyed) 9 : value reported (not confirmed)	EN	0,*

Comment [j70]: MD8 – 5.Co.2

Comment [j71]: MD8 – 4.Co.11 and 4.Cl.9.

Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 7 : entry prohibited 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 14 : area to be avoided 15 : construction prohibited 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transhipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 26 : landing prohibited 27 : speed restricted 28 : swimming prohibited	EN	1,*
Sounding uncertainty	(SOUACC)		RE	0,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 14 : public 16 : watched 17 : un-watched 19 : buoyed	EN	0,*
Value of sounding	(VALSOU)		RE	0,1
Vertical length	(VERLEN)		RE	0,1
Water level effect	(WATLEV)	1 : partly submerged at high water 2 : always dry 3 : always under water/ submerged 4 : covers and uncovers 5 : awash 7 : floating	EN	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1

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

Comment [j73]: S-57 Extension 06/01.

Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
— Authority			(S) TE	1,1
— Nationality			(S) TE	1,1
— ID code			(S) TE	0,1
— Source			(S) TE	0,1
— Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: K 47, 48

13.10.1 Marine farms (see S-4 – B- 447.4 and B-447.6)

Marine farms are collections of cages, nets, rafts and floats, or posts, where fish, including shellfish, are reared. They may obstruct navigation, and are likely to be marked by buoys and possibly lights. They are not always confined to inshore locations. Shellfish beds are found in shallow water. Depending on vessel draught and tidal range, it is usually possible to navigate over them, at high water, but they can be damaged by vessels anchoring or grounding on them.

If it is required to encode a marine farm, it must be done using the feature **Marine Farm/Culture**.

Remarks:
- When it is required to encode the minimum depth of the feature, the attributes **exposition of sounding** and **quality of sounding measurement** and the mandatory attribute **value of sounding** must be used. When a **Marine Farm/Culture** feature covers an area of the seafloor at the maximum display scale of the data, the value of the attribute **value of sounding** represents the minimum depth, if known, over any structure used to form or support the marine farm, or within the area of the marine farm itself. The mandatory attribute **water level effect** must be used to encode the water level of the shallowest section of the area, if partly or completely under water.
- The attribute **height** must be populated for **Marine Farm/Culture** features having attribute **water level effect** = *1* (partly submerged at high water) or *2* (always dry).
- The attribute **vertical length** is used to populate the distance of the marine farm above the seabed.
- Where required, ground tackle associated with marine farms must be encoded as **Obstruction** features (see clause X.X).

13.10.2 Fish havens (see S-4 – B- 447.5)

If it is required to encode a fish haven, it must be done using an **Obstruction** feature (see clause X.X), with attribute **category of obstruction** = *5* (fish haven).

Distinction: Fishing facility; obstruction.

14 Offshore Installations

14.1   Offshore platform

IHO Definition: **OFFSHORE PLATFORM**. A permanent offshore structure, either fixed or floating. (Adapted from IHO Dictionary – S-32).

S-101 Geo Feature: Offshore platform (OFSPLF)

Primitives: Point, Surface

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Category of offshore platform	(CATOFP)	1 : oil derrick/rig 2 : production platform 3 : observation/research platform 4 : articulated loading platform (ALP) 5 : single anchor leg mooring (SALM) 6 : mooring tower 7 : artificial island 8 : floating production, storage and off-loading vessel (FPSO) 9 : accommodation platform 10 : navigation, communication and control buoy (NCCB) 11 : windmotor	EN	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 4 : wingless 5 : planned construction	EN	0,1
Feature name			C	0,*

Comment [j74]: MD8 – 7.Cl.11 and 7.Co.6.

Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Flare stack			BO	0,1
Height	(HEIGHT)		RE	0,1
Product	(PRODCT)	1 : oil 2 : gas 3 : water 8 : drinking water 23 : electricity	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 7 : temporary 8 : private 12 : illuminated 16 : watched 17 : un-watched 19 : buoyed	EN	0,*
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Water level effect	(WATLEV)	2 : always dry 7 : floating	EN	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1
INT 1 Reference: L 2, 10-15, 17				

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

14.1.1 Offshore platforms (see S-4 – B-445.2; B-445.4 and B-445.5)

Several different types of platforms are in use. They are normally piled steel or concrete structures, the latter held in position on the sea floor by gravity. Tension Leg Platforms (TLP) consist of semi-submersible platforms secured to flooded caissons on the sea floor vertically below them by wires kept in tension by the buoyancy of the platform.

Platforms may serve a number of purposes. They may carry any of the following equipment: drilling and production equipment; oil and gas separation and treatment plants; pump-line stations; and electricity generators. They may be fitted with cranes, a helicopter landing deck, and accommodation for up to 350 people. Platforms may stand singly or in groups connected by pipelines. Some stand close together in a complex, with bridges and underwater cables connecting them. Unwanted gas or oil is sometimes burnt from a flaring boom extending from the platform or from a nearby flare stack.

If it is required to encode a permanent offshore platform, it must be done using the feature **Offshore Platform**.

Remarks:
- The attribute **height** is only relevant for fixed platforms, and is referred to the vertical datum (see clause X.X).
- The attribute **vertical length** is only relevant for floating platforms, and is referred to the seal level.
- If it is required to encode sites of dismantled platforms, this must be done using **Obstruction** features (see clause X.X), with attribute **category of obstruction** = *7* (foul ground).
- Platforms may carry lights (see clause X.X), fog signals (see clause X.X) and helicopter platforms (see clause X.X). Where fitted, lights should be encoded as described in clause X.X, with the **Offshore Platform** being used as the structure feature for the **Light** equipment feature(s) (see clause X.X).
- The extent and nature of any restricted area related to an offshore platform should be encoded using a **Restricted Area** feature (see clause X.X).

14.1.2 Wellheads (see S-4 – B-445.1)

In the course of developing an oil or gas field, numerous wells may be drilled. Some, which will not be required again, may be sealed at or below the sea floor and abandoned; such wells must not be encoded, as they have no relevance to navigation.

A submerged wellhead is a submarine structure projecting some distance above the sea floor and capping a temporarily abandoned (or "suspended") oil or gas well. Their associated pipes and other equipment usually project some 2 - 6 metres, but in some cases as much as 15 metres, above the sea floor. Some may be covered by steel cages to avoid snagging trawling gear. In certain instances, a wellhead may project above the sea surface. Wellheads must be encoded on at least the largest maximum display scale ENC data, together with associated buoys, as a hazard to fishing and, dependant on depth, as a hazard to deep-draught vessels and towed structures.

If it is required to encode wellheads, this must be done using **Obstruction** features of type point (see clause X.X), with attributes:

category of obstruction	-	*2* - wellhead
height		
status	-	*4* - not in use (disused)
value of sounding		
vertical length	-	vertical length of the wellhead above the seabed
water level effect	-	*2* - always dry (for wellheads that protrude at high water)
		3 - always under water/submerged

14.1.3 Offshore safety zones (see S-4 – B-445.6)

Under UNCLOS, a coastal State may establish safety zones around artificial islands, installations and structures in their EEZ and on their continental shelf. These installations include drilling rigs, production platforms, wellheads, moorings and other associated structures. Safety zones normally extend 500 metres from the outermost points of the installations. Within these zones, appropriate measures can be taken to ensure the safety of navigation and of the installations.

If it is required to encode an offshore safety zone, it must be done using a **Restricted Area** feature (see clause X.X), with attribute **category of restricted area** = *1* (offshore safety zone).

14.1.4 Flare stacks (see S-4 – B-445.2)

As with refineries on land, offshore terminals may burn off gas from production platforms or from "flare stacks" set up as separate structures a short distance from the production platforms.

If it is required to indicate the presence of a flare stack on an offshore platform, it must be done through

population of the attribute **flare stack**.

<u>Distinction</u>: Buoy, installation; hulk; landmark; offshore production area.

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 sea floor. (IHO Dictionary – S-32).

S-101 Geo Feature: Cable submarine (CBLSUB)

Primitives: Curve

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Buried depth	(BURDEP)		RE	0,1
Category of cable	(CATCBL)	1 : power line 4 : telephone 5 : telegraph 6 : mooring cable/chain	EN	0,1
Condition	(CONDTN)	1 : under construction 5 : planned construction	EN	0,1
Depth range minimum value	(DRVAL1)		RE	0,1
Depth range maximum value	(DRVAL2)		RE	0,1
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Status	(STATUS)	1 : permanent 4 : not in use 13 : historic	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
~~Recording date~~	~~(RECDAT)~~	~~ISO 8601:1988~~	~~DA~~	~~0,1~~
~~Recording indication~~	~~(RECIND)~~		~~TE~~	~~0,1~~
~~Source indication~~			~~C~~	~~0,*~~
~~Authority~~			~~(S) TE~~	~~1,1~~

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

INT 1 Reference: L 30.1, 31.1, 32; Q 42

14.2.1   Submarine cables (see S-4 – B-443; B-443.1-2 and B-443.7-8)

Submarine cables are used to carry power or telecommunications. All power cables and most telecommunication cables carry dangerous voltages. Submarine cables are potential hazards to both vessels and life, particularly to fishing vessels engaged in trawling the seabed. Where possible, submarine cables are now buried beneath the sea floor in water depths of less than 1000 metres; however there remains a large percentage unburied. Submarine cables are vulnerable to damage from anchoring, trawling or other seabed operations; even small craft anchors can penetrate a soft seabed sufficiently to foul a cable. Damage to telecommunication cables can lead to extensive disruption of national and international communications, whilst damage to power cables can disrupt electricity supply.

Submarine cables, including disused cables, should be encoded to indicate their presence to vessels engaged in anchoring, trawling or seabed activities in order to:
- Warn mariners of the potential hazard to their vessel, including electric shock to any vessel fouling or breaking the cable, possible capsize of a small vessel if its fishing gear or anchor is trapped under the cable, or loss of gear (trawls or anchor cables).
- Prevent damage to the cable and avoid disrupting the service the cable may be providing.

Active cables should be encoded to a depth of 2000 metres (which is the deepest depth of water to which vessels may be endangered by fouling the cable).

If it is required to encode a submarine cable, it must be done using the feature **Cable Submarine**.

Remarks:
- If the buried depth varies along the cable, the cable must be encoded as several features.
- The attributes **depth range minimum value** and **depth range maximum value** are used to encode the shallowest end deepest depth over the cable.
- Where a cable is disused, it should be encoded with the attribute **status** = *4* (not in use), and the attribute **category of cable** should not be encoded. Few disused cables are recovered and so to encode them all would lead to clutter in the data. Also, accurate records of their positions are likely to be incomplete (some cables having been cut or dragged out of position), so there is a case for encoding them very selectively. Where disused cables traverse possible anchorages or where there is known seabed activity, e.g. trawling grounds, they should be encoded on the largest maximum display scale ENC data covering the area, provided they do not obscure more important information.
- In certain circumstances, high voltage power cables may cause a deviation in a ship's magnetic compass; in these cases, where reports have been received, they should be treated as local magnetic anomalies (see clause X.X).
- Cables, buried so deep that they are not vulnerable to damage from anchoring, should not be encoded (so that mariners are not unnecessarily inhibited from anchoring or fishing). In marginal cases they may be encoded as **Cable Submarine** with the nominal depth to which they are buried encoded using the attribute **buried depth**.

Distinction: Cable, overhead; cable area.

14.3   Submarine cable area

IHO Definition: **CABLE AREA**. An area which contains one or more submarine cables. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.70, November 2000, as amended).
S-101 Geo Feature: Cable area (CBLARE)
Primitives: Surface

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of cable	(CATCBL)	1 : power line 4 : telephone 5 : telegraph	EN	0,1
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 7 : entry prohibited 8 : entry restricted 9 : dredging prohibited ~~10 : dredging restricted~~ 11 : diving prohibited 12 : diving restricted 13 : no wake 14 : area to be avoided 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited ~~19 : industrial or mineral exploration/development restricted~~ 20 : drilling prohibited ~~21 : drilling restricted~~ ~~22 : removal of historical artefacts prohibited~~ 23 : cargo transhipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 27 : speed restricted	EN	0,*

		28 : swimming prohibited		
Status	(STATUS)	1 : permanent 7 : temporary 13 : historic	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
~~Recording date~~	~~(RECDAT)~~	~~ISO 8601:1988~~	~~DA~~	~~0,1~~
~~Recording indication~~	~~(RECIND)~~		~~TE~~	~~0,1~~
~~Source indication~~			~~C~~	~~0,*~~
~~ Authority~~			~~(S) TE~~	~~1,1~~
~~ Nationality~~			~~(S) TE~~	~~1,1~~
~~ ID code~~			~~(S) TE~~	~~0,1~~
~~ Source~~			~~(S) TE~~	~~0,1~~
~~ Source date~~	~~(SORDAT)~~	~~ISO 8601:1988~~	~~(S) DA~~	~~1,1~~

<u>INT 1 Reference:</u> L 30.2, 31.2

14.3.1 Submarine cable areas (see S-4 – B-439.3 and B-443.3)

Cable areas should be encoded where:
- cables (including disused cables) are so numerous in an area that it would be impossible to encode them individually without impairing the legibility of the ENC; or
- a regulatory authority designates an area for the protection of a cable, or cables.

If it is required to encode a submarine cable area, it must be done using the feature **Cable Area**.

<u>Remarks:</u>
- Where populated, the attribute **status** must only be used to encode the status of the area and not the status of the cables in the area.
- The outer limits of a cable area must enclose the area in which anchoring and certain forms of fishing are prohibited or inadvisable, i.e., the limits must lie a safe distance beyond the actual lines of the outermost cables.

<u>Distinction:</u> Cable, overhead; cable, submarine.

Comment [j76]: S-57 Extension 06/01.

14.4   Submarine/land pipelines

IHO Definition: **PIPELINE**.   A connected set of pipes for conveying liquids, slurries, or gases. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2012).

A submarine or land pipeline is a pipeline lying on or buried under the seabed or the land. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.120, November 2000).

S-101 Geo Feature: Pipeline submarine/on land (PIPSOL)

Primitives: ~~Point,~~ Curve

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Buried depth	(BURDEP)		RE	0,1
Category of pipeline/pipe	(CATPIP)	2 : outfall pipe 3 : intake pipe 4 : sewer 5 : bubbler system 6 : supply pipe	EN	0,*
Condition	(CONDTN)	1 : under construction 5 : planned construction	EN	0,1
Depth range minimum value	(DRVAL1)		RE	0,1
Depth range maximum value	(DRVAL2)		RE	0,1
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Product	(PRODCT)	1 : oil 2 : gas 3 : water 7 : chemicals 8 : drinking water 9 : milk 18 : liquefied natural gas (LNG) 19 : liquefied petroleum gas (LPG) ~~20 : wine~~ ~~22 : grain~~	EN	0,*
Restriction	(RESTRN)	1 : anchoring prohibited ~~2 : anchoring restricted~~ 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited ~~6 : trawling restricted~~	EN	0,*

		7 : entry prohibited		
		8 : entry restricted		
		9 : dredging prohibited		
		10 : dredging restricted		
		11 : diving prohibited		
		12 : diving restricted		
		13 : no wake		
		14 : area to be avoided		
		15 : construction prohibited		
		16 : discharging prohibited		
		17 : discharging restricted		
		18 : industrial or mineral exploration/development prohibited		
		19 : industrial or mineral exploration/development restricted		
		20 : drilling prohibited		
		21 : drilling restricted		
		22 : removal of historical artefacts prohibited		
		23 : cargo transhipment (lightening) prohibited		
		24 : dragging prohibited		
		25 : stopping prohibited		
		26 : landing prohibited		
		27 : speed restricted		
		28 : swimming prohibited		
Status	(STATUS)	1 : permanent 4 : not in use 7 : temporary 12 : illuminated	EN	0,*
Vertical length	(VERLEN)		RE	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

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

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; B-444; B-444.1-2; B-444.4-5 and B-444.7)

Submarine pipelines can be divided into two main categories:
• Oil, chemical, gas and water supply pipelines are an important feature of many areas. The pipes are generally encased in concrete for protection and to give them negative buoyancy, which can significantly increase their external diameter. Pipelines are generally laid directly on the seabed, with sections over local dips or hollows being supported physically from beneath. In some cases (e.g. in shallow water or near the shore), where the external diameter of the pipeline would represent a significant reduction in the water depth above it, the pipelines may be laid in trenches and possibly buried.

In all cases it must be assumed that the pipes are vulnerable to damage from anchoring or trawling, although in a few cases concrete domes are used to protect particularly vulnerable junctions. Gas pipes present a severe hazard to ships damaging them (by fire, explosion, or possibly loss of buoyancy). Oil and chemical pipes are a danger to the environment if fractured. Damage to water pipes supplying residential areas, mainly islands, results in disruption or contamination of the water supply. In the above cases, submarine pipelines must be encoded on all appropriate maximum display scale ENC datasets.

- Outfalls and intakes such as sewers, and cooling water intakes, are mainly a feature of inshore waters. For small craft, in particular, such pipes are a potential danger to navigation. The pipes are also vulnerable to damage. They should be encoded on at least the largest maximum display scale ENC datasets.

If it is required to encode a submarine or land pipeline, it must be done using the feature **Pipeline Submarine/On Land**.

Remarks:
- If the buried depth varies along a submerged pipeline, the cable must be encoded as several features.
- The attributes **depth range minimum value** and **depth range maximum value** are used to encode the shallowest end deepest depth over the pipeline.
- Where a pipeline is disused, it should be encoded with the attribute **status** = *4* (not in use), and the attributes **category of pipeline/pipe** and **product** should not be encoded.
- Submarine pipes, buried so deep that they are not vulnerable to damage from anchoring, should not be encoded (so that mariners are not unnecessarily inhibited from anchoring or fishing). In marginal cases they may be encoded as **Pipeline Submarine/On Land** with the nominal depth to which they are buried encoded using the attribute **buried depth**.
- Buried pipelines on land should not be encoded.

14.4.2 Diffusers, cribs

If it is required to encode diffusers and cribs, this must be done using **Obstruction** features (see clause X.X), with attribute **category of obstruction** = *3* (diffuser) or *4* (crib).

Distinction: Pipeline area; pipeline, overhead.

14.5   Submarine pipeline area

IHO Definition: **SUBMARINE PIPELINE AREA**. An area containing one or more submarine pipelines. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.118, November 2000).

S-101 Geo Feature: Submarine pipeline area (PIPARE)

Primitives: Point, Surface

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Category of pipeline/pipe	(CATPIP)	2 : outfall pipe 3 : intake pipe 4 : sewer 5 : bubbler system 6 : supply pipe	EN	0,*
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Product	(PRODCT)	1 : oil 2 : gas 3 : water 7 : chemicals 8 : drinking water 18 : liquefied natural gas (LNG) 19 : liquefied petroleum gas (LPG) 20 : wine	EN	0,*
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 7 : entry prohibited 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 14 : area to be avoided 15 : construction prohibited 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral	EN	0,*

			exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transhipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 26 : landing prohibited 28 : swimming prohibited		
Status		(STATUS)	1 : permanent 4 : not in use 7 : temporary	EN	0,*
Information				C	0,*
Language			ISO 639-3	(S) TE	0,1
Text		(INFORM)		(S) TE	1,1
Textual description				C	0,*
File reference		(TXTDSC)		(S) TE	1,1
Language			ISO 639-3	(S) TE	0,1
Scale minimum		(SCAMIN)	See clause X.X	IN	0,1
~~Recording date~~		~~(RECDAT)~~	~~ISO 8601:1988~~	~~DA~~	~~0,1~~
~~Recording indication~~		~~(RECIND)~~		~~TE~~	~~0,1~~
~~Source indication~~				~~C~~	~~0,*~~
~~ Authority~~				~~(S) TE~~	~~1,1~~
~~ Nationality~~				~~(S) TE~~	~~1,1~~
~~ ID code~~				~~(S) TE~~	~~0,1~~
~~ Source~~				~~(S) TE~~	~~0,1~~
~~ Source date~~		~~(SORDAT)~~	~~ISO 8601:1988~~	~~(S) DA~~	~~1,1~~

Comment [j78]: S-57 Extension 06/01

INT 1 Reference: L 40.2, 41.2

14.5.1   Submarine pipeline areas (see S-4 – B-439.3 and B-444.3)

Submarine pipeline areas should be encoded where:
- pipelines (including disused pipelines) are so numerous in an area that it would be impossible to encode them individually without impairing the legibility of the ENC; or
- a regulatory authority designates an area for the protection of a pipeline, or pipelines.

If it is required to encode a submarine pipeline area, it must be done using the feature **Submarine Pipeline Area**.

Remarks:
- Where populated, the attribute **status** must only be used to encode the status of the area and not the status of the pipelines in the area.
- The outer limits of a pipeline area must correspond to the area in which anchoring, trawling and dredging are prohibited or inadvisable, i.e., the limits must lie at a safe distance beyond the actual lines of the outermost pipes.
- Where a pipeline area is disused, the **Submarine Pipeline Area** should be encoded with the attribute **Status** = 4 (not in use), and the attributes **category of pipeline/pipe** and **product** should not be encoded.

Distinction: Pipeline, 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 Edition 3.1, Appendix A – Chapter 1, Page 1.113, November 2000).
S-101 Geo Feature: Offshore production area (OSPARE)
Primitives: Surface
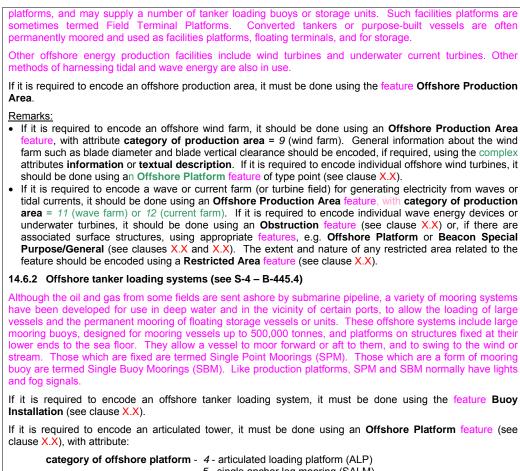
Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of production area	(CATPRA)	1 : quarry 2 : mine 5 : refinery area 8 : tank farm 9 : wind farm 11 : wave farm 12 : current farm 13 : seabed material extraction area	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 4 : wingless 5 : planned construction	EN	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Height	(HEIGHT)		RE	0,1
Product	(PRODCT)	1 : oil 2 : gas 4 : stone 6 : ore 10 : bauxite 14 : sand	EN	0,*
Radar conspicuous	(CONRAD)		BO	0,1
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 7 : entry prohibited 8 : entry restricted 9 : dredging prohibited	EN	0,*

		10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 14 : area to be avoided 15 : construction prohibited 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transhipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 26 : landing prohibited 28 : swimming prohibited		
Status	(STATUS)	1 : permanent 4 : not in use 7 : temporary 8 : private 12 : illuminated 19 : buoyed	EN	0,*
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: L 4, 5.2

14.6.1 Offshore production areas (see S-4 – B-445.3; B-445.9; B-445.11 and B-445.12)

Oil and gas fields are exploited in many parts of the world. Although the basic methods for extracting oil and gas are well established, details of the systems and structures may vary with the characteristics of the different fields and are continually being developed. In a typical field, oil or gas is obtained from wells drilled from fixed production platforms, usually standing on the seabed. From each production platform, the oil or gas is carried in pipes to a facilities platform where primary processing, compression and pumping are carried out. The oil or gas is then transported through pipelines to a nearby storage tank, tanker loading buoy or floating terminal, or direct to a tank farm on shore. One facilities platform may collect the oil or gas from several production

platforms, and may supply a number of tanker loading buoys or storage units. Such facilities platforms are sometimes termed Field Terminal Platforms. Converted tankers or purpose-built vessels are often permanently moored and used as facilities platforms, floating terminals, and for storage.

Other offshore energy production facilities include wind turbines and underwater current turbines. Other methods of harnessing tidal and wave energy are also in use.

If it is required to encode an offshore production area, it must be done using the feature **Offshore Production Area**.

Remarks:
- If it is required to encode an offshore wind farm, it should be done using an **Offshore Production Area** feature, with attribute **category of production area = *9*** (wind farm). General information about the wind farm such as blade diameter and blade vertical clearance should be encoded, if required, using the complex attributes **information** or **textual description**. If it is required to encode individual offshore wind turbines, it should be done using an **Offshore Platform** feature of type point (see clause X.X).
- If it is required to encode a wave or current farm (or turbine field) for generating electricity from waves or tidal currents, it should be done using an **Offshore Production Area** feature, with **category of production area** = *11* (wave farm) or *12* (current farm). If it is required to encode individual wave energy devices or underwater turbines, it should be done using an **Obstruction** feature (see clause X.X) or, if there are associated surface structures, using appropriate features, e.g. **Offshore Platform** or **Beacon Special Purpose/General** (see clauses X.X and X.X). The extent and nature of any restricted area related to the feature should be encoded using a **Restricted Area** feature (see clause X.X).

14.6.2   Offshore tanker loading systems (see S-4 – B-445.4)

Although the oil and gas from some fields are sent ashore by submarine pipeline, a variety of mooring systems have been developed for use in deep water and in the vicinity of certain ports, to allow the loading of large vessels and the permanent mooring of floating storage vessels or units. These offshore systems include large mooring buoys, designed for mooring vessels up to 500,000 tonnes, and platforms on structures fixed at their lower ends to the sea floor. They allow a vessel to moor forward or aft to them, and to swing to the wind or stream. Those which are fixed are termed Single Point Moorings (SPM). Those which are a form of mooring buoy are termed Single Buoy Moorings (SBM). Like production platforms, SPM and SBM normally have lights and fog signals.

If it is required to encode an offshore tanker loading system, it must be done using the feature **Buoy Installation** (see clause X.X).

If it is required to encode an articulated tower, it must be done using an **Offshore Platform** feature (see clause X.X), with attribute:

category of offshore platform - *4* - articulated loading platform (ALP)
5 - single anchor leg mooring (SALM)
8 - floating production, storage and off-loading vessel (FPSO)
10 - navigation, communication and control buoy (NCCB) (which may include storage facilities)

Distinction: Offshore platform; Exclusive Economic Zone.

15 Tracks and Routes

15.1   Leading, clearing and transit lines and recommended tracks (see S-4 – B-433 and B-434)

If it is required to encode leading, clearing and transit lines and recommended tracks, it must be done using the features **Navigation Line** and **Recommended Track** (see clauses X.X and X.X), and related point navigational aids features (see section XX). This applies for visual and radio navigational aids.
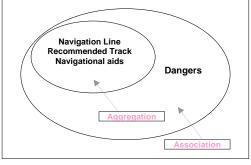
Relationships should be defined between these features (see clauses X.X and X.X).

NB. In North America the word "range" is used instead of "transit" and "leading line".

15.1.1 Range systems - relationship

To encode a range system, the features **Navigation Line**, **Recommended Track** and the navigational aids features should be aggregated using a collection feature **C_AGGR** (see clause X.X).
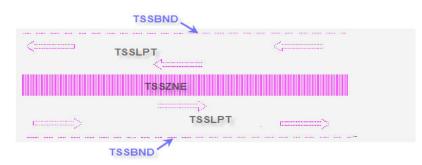
This aggregation feature may also be associated, using a collection feature **C_ASSO** (see clause X.X), with the dangers (e.g. **Obstruction**, **Wreck**, **Underwater/Awash Rock** features) marked by the clearing or transit line.

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 may be composed of the following features: **Traffic Separation Scheme Lane Part** and **Deep Water Route Part**.

Traffic Lanes - Example

15.3   Traffic separation schemes and traffic separation scheme systems

A traffic separation scheme is a routeing 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:
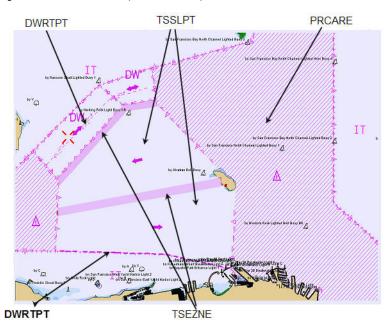
1)   The traffic lanes in which ships are proceeding in opposite or nearly opposite directions,

2)   A traffic lane from the adjacent sea area, or

3)   Traffic lanes designated for particular classes of ships proceeding in the same direction.

If it is required to encode a traffic separation scheme, it must be done using **Deep Water Route Centreline**, **Deep Water Route Part**, **Inshore Traffic Zone**, **Precautionary Area**, **Traffic Separation Line**, **Traffic Separation Zone**, **Traffic Separation Scheme Boundary**, **Traffic Separation Scheme Crossing**, **Traffic Separation Scheme Lane Part**, **Traffic Separation Scheme Roundabout** features, and navigational aids features.

The encoding of relationships between these features is defined in clause X.X.

For guidance on provision of advance notification of changes to traffic separation schemes, see clause X.X.

To encode a traffic separation scheme (TSS) system, the **Deep Water Route Centreline**, **Deep Water Route Part**, **Inshore Traffic Zone**, **Precautionary Area**, **Traffic Separation Line**, **Traffic Separation Zone**, **Traffic Separation Scheme Boundary**, **Traffic Separation Scheme Crossing**, **Traffic Separation Scheme Lane Part**, **Traffic Separation Scheme Roundabout** features, and the navigational aids features (if they are stated in the regulation defining the TSS or Deep Water route), must be aggregated using the collection feature **C_AGGR** (see clause X.X). Where it is required to indicate the name of the complete aggregated TSS, this should be done using a **Sea Area/Named Water Area** feature (see clause X.X), or by populating the complex attribute **feature name** for the most representative feature in the TSS. Where it is required to populate textual information for the TSS, this should be done using a **Nautical Publication Information** feature (see clauses X.X), with complex attributes **information** and/or **textual description** (see clause X.X), or if the information is considered essential for safe navigation, using a **Caution Area** feature (see clause X.X).

Sample Traffic Separation Scheme (TSS) and Deep Water route (DW)

Remarks:
- Traffic separation scheme systems may be included with other routeing measures such as Deep Water or two-way routes, or another traffic separation scheme system, to comprise a complete traffic routeing system. To encode the relationship between routeing measures, the **C_AGGR** defining each routeing measure within the system (or the relevant feature if the routeing measure consists of a single feature) may be aggregated using **C_AGGR** to form a hierarchical relationship (see clause X.X). The individual elements comprising different routeing measures must not be aggregated into a single **C_AGGR**.

15.4   Navigation line

IHO Definition: **NAVIGATION LINE**. A straight line extending towards an area of navigational interest and generally generated by two navigational aids or one navigational aid and a bearing. (Service Hydrographique et Oceanograhique de la Marine, France).

S-101 Geo Feature: Navigation line (NAVLNE)

Primitives: Curve

Real World	*Paper Chart Symbol*	*ECDIS Symbol*	

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of navigation line	(CATNAV)	1 : clearing line 2 : transit line 3 : leading line bearing a recommended track	EN	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Orientation			C	1,1
Orientation uncertainty			(S) RE	0,1
Orientation value	(ORIENT)		(S) RE	1,1
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Status	(STATUS)	1 : permanent 2 : occasional 5 : periodic/intermittent 7 : temporary 8 : private 14 : public	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: M 1-2; Q 122

15.4.1   Navigation lines (see S-4 – B-433)

Clearing Lines are important in rocky areas where dangers are not guarded by buoys and where sailing vessels (which are not always able to keep to a direct track) and other small craft may navigate close inshore. Transits marking isolated dangers are based on beacons or other marks which are erected on shore to indicate (approximately, unless there are two pairs of beacons) the position of an isolated danger. Leading lines based on beacons or lights must be encoded where the maximum display scale for the ENC data permits.   Leading lines based on natural features should be encoded on the largest maximum display scale ENC data where they appear to be useful, particularly if other navigational aids seem inadequate.

If it is required to encode a navigation line, it must be done using the feature **Navigation Line**.

The use of **Navigation Line** and **Recommended Track** (see clause X.X) is defined in more detail in the following Table, and in the Figure below:

Figure		Navigation Line	Recommended Track	Navigational Aids
1	Recommended track on a leading line	**category of navigation line** = *3*	**category of recommended track** = *1*	at least 2
2	Clearing line on marks in line	**category of navigation line** = *1*	none	at least 2
3	Transit line on marks in line	**category of navigation line** = *2*	none	at least 2
4	Recommended track on a bearing	**category of navigation line** = *3*	**category of recommended track** = *1*	1
5	Clearing line on a bearing	**category of navigation line** = *1*	none	1
6	Transit line on a bearing	**category of navigation line** = *2*	none	1
7	Recommended track not based on fixed marks	none	**category of recommended track** = *2*	none

Remarks:
- The value populated for the mandatory complex attribute **orientation** must be the value of the bearing from seaward.
- The extent of the navigation line depends on the visibility of the navigational aids.
- The recommended track is that portion of a navigation line that a ship should use for navigation.

15.4.2 Measured distances (see S-4 – B-458)

If the track to be followed is on a leading line or a bearing, it must be encoded in the way described in the Table and Figure above (cases 1 or 4). If the track is not on a leading line or bearing, it must be encoded only as a **Navigation Line** feature with the attribute **category of navigation line** being set to an empty (null) value. In either case, if it is required to encode the measured distance, it must be done using the attribute **information** (e.g. *Measured distance = 1450 metres*).

If it is required to encode the transit lines, they must be done using **Navigation Line** features, with **category of navigation line** = *2* (transit line).

If it is required to encode the beacons, they must be done using **Beacon Special Purpose/General** features, with attribute **category of special purpose mark** = *17* (measured distance mark).

On occasions, one or more of the transits used for the measured distance may incorporate an existing landmark as the front or rear mark. In this case, if **Landmark** is encoded, **category of special purpose mark** = *17* must also be populated.

Where the entire measured distance system exists within a single dataset, each transit line with its beacons must be aggregated into a collection feature **C_AGGR** (see clause **X.X**). These two aggregation features and the track to be followed must be aggregated into another **C_AGGR** feature.

Remarks:

Distinction: Recommended route; recommended track.

15.5   Recommended track

IHO Definition: **RECOMMENDED TRACK**. A track recommended to all or only certain vessels. (IHO Dictionary – S-32).

S-101 Geo Feature: Recommended track (RECTRC)

Primitives: Curve, Surface

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Category of recommended track	(CATTRK)	1 : based on a system of fixed marks 2 : not based on a system of fixed marks	EN	1,1
Depth range minimum value	(DRVAL1)		RE	0,1
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Maximum permitted draught			RE	1,1
Orientation			C	1,1
Orientation uncertainty			(S) RE	0,1
Orientation value	(ORIENT)		(S) RE	1,1
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Quality of sounding measurement	(QUASOU)	1 : depth known 2 : depth or least depth unknown ~~3 : doubtful sounding~~ ~~4 : unreliable sounding~~ 6 : least depth known	EN	0,*
Sounding uncertainty	(SOUACC)		RE	0,1
Status	(STATUS)	1 : permanent 2 : occasional 5 : periodic/intermittent 7 : temporary 9 : mandatory 12 : illuminated 16 : watched 17 : un-watched	EN	0,*

Comment [j82]: MD8 – 4.Co.11 and 4.Cl.9.

Technique of sounding measurement	(TECSOU)	1 : found by echo-sounder 2 : found by side scan sonar 3 : found by multi-beam 6 : swept by wire-drag 7 : found by laser 8 : swept by vertical acoustic system 9 : found by electromagnetic sensor 11 : satellite imagery 13 : swept by side-scan sonar	EN	0,*
Traffic	(TRAFIC)	1 : inbound 2 : outbound 3 : one-way 4 : two-way	EN	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: M 3-6

15.5.1   Recommended tracks (see S-4 – B-432.1; B-434 and B-434.1-4)

Recommended tracks and fairways usually comprise a number of sections (sometimes termed "legs") which lead between dangers lying close on both sides of the track or fairway. Tracks commonly include some sections which are leading lines (see clause X.X). The distinction between tracks and fairways, in this context, is that tracks have no specified outer limits and fairways do have specified outer limits.

It is important to recognise that it is not the role of cartographers to create "recommended" tracks and other "recommended" routeing measures; such recommendations are made by other authorities. The word "Recommended", used in connection with recommended tracks and other recommended routeing measures usually implies that it has been recommended by a competent authority (such as a port authority within its port limits or a maritime safety authority) and may be adopted by IMO. Occasionally, the recommendation may be based on advice directly from a competent surveyor or established by precedent.

Recommended tracks include all channels recommended for hydrographic reasons to lead safely between shoal depths. The use of such tracks is generally left to the discretion of the mariner and will depend on the vessel's draught, the state of the tide, adequacy of navigational aids and so on.

If it is required to encode a recommended track, it must be done using the feature **Recommended Track**.

The use of **Navigation Line** and **Recommended Track** is defined in more detail in the following Table, and in the Figure below.

Figure		Navigation Line	Recommended Track	Navigational Aids

1	Recommended track on a leading line	**category of navigation line** = *3*	**category of recommended track** = *1*	at least 2
2	Clearing line on marks in line	**category of navigation line** = *1*	none	at least 2
3	Transit line on marks in line	**category of navigation line** = *2*	none	at least 2
4	Recommended track on a bearing	**category of navigation line** = *3*	**category of recommended track** = *1*	1
5	Clearing line on a bearing	**category of navigation line** = *1*	none	1
6	Transit line on a bearing	**category of navigation line** = *2*	none	1
7	Recommended track not based on fixed marks	none	**category of recommended track** = *2*	none

Two navigational aids

1 — Recommended Track / Navigational System

Two navigational aids

2 & 3 — Navigation Line

One navigational aid

4 — Recommended Track / Navigation Line

One navigational aid

5 & 6 — Navigation Line

No navigational aids

7 — Recommended Track

Remarks:
- The attribute **depth range minimum value** is used to encode the shallowest depth along the track, where required.
- The attribute **maximum permitted draught** is used to encode the maximum draught permitted on the track, where required.
- The recommended track is that portion of a navigation line (see clause X.X) that a ship should use for navigation (see Figure above).
- In the case of a two-way recommended track, only one value of orientation is encoded (in the complex attribute **orientation**); the other value can be deduced (i.e. the value in **orientation** (orientation value) + 180 degrees). The value of orientation encoded on **orientation** (orientation value) should be the value of the bearing from seaward. If it is not possible to define a seaward direction, the value that is less than 180° should be used.
- When the traffic flow along a recommended track is one way (attribute **traffic** = *1*, *2* or *3*), the resultant direction of the line (accounting for the direction of digitising and any subsequent reversal of the line) associated with the **Recommended Track** must be the same as the direction of the traffic flow, in order to ensure the correct representation in the ECDIS of the direction to be followed.

Distinction: Fairway; navigation line; recommended route centreline; recommended traffic lane part.

15.6 Fairways

<u>IHO Definition:</u> **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).

S-101 Geo Feature: Fairway (FAIRWY)

Primitives: Surface

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Depth range minimum value	(DRVAL1)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Orientation			C	0,1
Orientation uncertainty			(S) RE	0,1
Orientation value	(ORIENT)		(S) RE	1,1
Quality of sounding measurement	(QUASOU)	1 : depth known 2 : depth or least depth unknown 3 : doubtful sounding 4 : unreliable sounding 6 : least depth known	EN	0,*
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 15 : construction prohibited 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development	EN	0,*

Comment [j83]: MD8 – 4.Co.11 and 4.Cl.9.

		restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transhipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 27 : speed restricted 28 : swimming prohibited		
Sounding uncertainty	(SOUACC)		RE	0,1
Status	(STATUS)	1 : permanent 3 : recommended 6 : reserved 7 : temporary 9 : mandatory 19 : buoyed	EN	0,*
Traffic	(TRAFIC)	1 : inbound 2 : outbound 3 : one-way 4 : two-way	EN	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

> **Comment [j84]:** S-57 Extension 06/01.

> **Comment [j85]:** S-57 Extension 06/01.

INT 1 Reference: M 18

15.6.1 Fairways (see S-4 – B-432.1(c) and B-434.5)

A fairway, sometimes called Ship Channel, is the main navigable channel in the approaches to, or within, a river or harbour. Fairways which are designated by a regulatory authority are treated as Routeing Measures.

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

Remarks:
- The attribute **depth range minimum value** is used to encode the shallowest depth in the fairway, where known.
- 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 beacons or buoys marking a fairway are offset from the actual fairway limits, this should be indicated using the complex attribute **information** on the **Fairway** 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). The recommended route centreline indicates the "centreline" of a recommended route. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.137, November 2000).	

S-101 Geo Feature: Recommended route centreline (RCRTCL)

Primitives: Curve

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of recommended track	(CATTRK)	1 : based on a system of fixed marks 2 : not based on a system of fixed marks	EN	1,1
Depth range minimum value	(DRVAL1)		RE	0,1
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Orientation			C	0,1
Orientation uncertainty			(S) RE	0,1
Orientation value	(ORIENT)		(S) RE	1,1
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Quality of sounding measurement	(QUASOU)	1 : depth known 2 : depth or least depth unknown 3 : doubtful sounding 4 : unreliable sounding 6 : least depth known	EN	0,*
Sounding uncertainty	(SOUACC)		RE	0,1
Status	(STATUS)	1 : permanent 5 : periodic/intermittent 6 : reserved 9 : mandatory	EN	0,*
Technique of sounding measurement	(TECSOU)	1 : found by echo-sounder ~~2 : found by side scan sonar~~	EN	0,*

Comment [j86]: MD8 – 4.Co.11 and 4.Cl.9.

		3 : found by multi-beam 6 : swept by wire-drag 7 : found by laser 8 : swept by vertical acoustic system 9 : found by electromagnetic sensor 11 : satellite imagery 13 : swept by side-scan sonar		
Traffic	(TRAFIC)	1 : inbound 2 : outbound 3 : one-way 4 : two-way	EN	0,1
Water level effect	(WATLEV)	1 : partly submerged at high water 2 : always dry 3 : always under water / submerged 4 : covers and uncovers 5 : awash 6 : subject to inundation or flooding	EN	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: M 28.1

15.7.1 Recommended routes (see S-4 – B-435.4)

IMO-designated recommended routes are listed in IMO publication "*Ships' Routeing*" Part E. This type of routeing measure was adopted to include such features as the "transit routes" (through former minefields) in the entrances to the Baltic Sea. In contrast to recommended tracks (see clause X.X), there is usually ample sea-room for vessels to keep well starboard (to the right) of the centreline.

If it is required to encode the centreline of a recommended route, it must be done using the feature **Recommended Route Centreline**.

Remarks:
- The attribute **depth range minimum value** is used to encode the shallowest depth on the route, where known.
- In the case of a recommended route centreline, only one value of orientation is encoded (in the complex attribute **orientation**); the other value can be deduced (i.e. the value in **orientation** (orientation value) + 180 degrees). The value of orientation encoded on **orientation** (orientation value) should be the value of the bearing from seaward. If it is not possible to define a seaward direction, the value that is less than 180°

should be used.

- When the traffic flow is one way (attribute **traffic =** *1*, *2* or *3*), the resultant direction of the line (accounting for the direction of digitising and any subsequent reversal of the line) associated with the **Recommended Route Centreline** must be the same as the direction of traffic flow, in order to ensure the correct representation in the ECDIS of the direction to be followed.

Distinction: Recommended track; recommended traffic lane part.

15.8   Two-way route part

<u>IHO Definition:</u> **TWO-WAY ROUTE PART**. A two way route is a route within defined limits inside which two way traffic is established, aimed at providing safe passage of ships through waters where navigation is difficult or dangerous.(IHO Dictionary – S-32).

A two-way route part is an area of a two-way route within which traffic flow is generally along one bearing (and possibly its reciprocal). (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.193, November 2000).

<u>**S-101 Geo Feature:**</u> **Two-way route part (TWRTPT)**

<u>**Primitives:**</u> **Surface**

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of recommended track	(CATTRK)	1 : based on a system of fixed marks 2 : not based on a system of fixed marks	EN	0,1
Depth range minimum value	(DRVAL1)		RE	0,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Orientation			C	1,1
Orientation uncertainty			(S) RE	0,1
Orientation value	(ORIENT)		(S) RE	1,1
Quality of sounding measurement	(QUASOU)	1 : depth known 2 : depth or least depth unknown 3 : doubtful sounding 4 : unreliable sounding 6 : least depth known	EN	0,*
Sounding uncertainty	(SOUACC)		RE	0,1
Status	(STATUS)	1 : permanent 3 : recommended 6 : reserved 9 : mandatory	EN	0,*
Technique of sounding measurement	(TECSOU)	1 : found by echo-sounder 2 : found by side scan sonar 3 : found by multi-beam 5 : found by lead-line 6 : swept by wire-drag 7 : found by laser 8 : swept by vertical acoustic system 9 : found by electromagnetic sensor 10 : photogrammetry 11 : satellite imagery 13 : swept by side-scan sonar	EN	0,*
Traffic	(TRAFIC)	1 : inbound 2 : outbound	EN	1,1

Comment [j87]: MD8 – 4.Co.11 and 4.Cl.9.

		3 : one-way 4 : two-way		
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
~~Recording date~~	~~(RECDAT)~~	~~ISO 8601:1988~~	~~DA~~	~~0,1~~
~~Recording indication~~	~~(RECIND)~~		~~TE~~	~~0,1~~
~~Source indication~~			~~C~~	~~0,*~~
~~Authority~~			~~(S) TE~~	~~1,1~~
~~Nationality~~			~~(S) TE~~	~~1,1~~
~~ID code~~			~~(S) TE~~	~~0,1~~
~~Source~~			~~(S) TE~~	~~0,1~~
~~Source date~~	~~(SORDAT)~~	~~ISO 8601:1988~~	~~(S) DA~~	~~1,1~~

<u>INT 1 Reference:</u> M 28.2

15.8.1 Two-way Routes (see S-4 – B-435.6)

A two-way route consists of one or more areas within which traffic flows in two directions along one bearing and/or its reciprocal. Such routes are established by regulatory authorities and may be adopted by IMO. IMO-designated two-way routes are listed in IMO publication "*Ships' Routeing*" Part E. When it is required to encode these areas, this must be done using the feature **Two-way Route Part**. These route parts will generally be two-way, but some may be restricted to one-way traffic flow.

One-way traffic flow in a two-way route

If it is required to encode a two-way route with one-way sections, separate **Two-way Route Part** features must be encoded for the different parts, with attribute **traffic =** *3* (one-way) or *4* (two-way). In one-way sections, the mandatory complex attribute **orientation** must indicate the true direction of traffic flow, not its reciprocal. In two-way sections, **orientation** may indicate either direction of traffic flow.

<u>Remarks:</u>
- The orientation of the two-way route part is defined by the centreline of the part and is related to the general direction of the two-way route.
- The attribute **depth range minimum value** is used to encode the shallowest depth on the part, where required.
- To encode a complete two-way route, the **Two-way Route Part** features may be aggregated using the collection feature **C_AGGR** (see clause X.X). Where it is required to indicate the name of an aggregated two-way route, this should be done using a **Sea Area/Named Water Area** feature (see clause X.X), or by populating **feature name** for the most representative feature in the two-way route. Where it is required to populate textual information for the two-way route, this should be done using a **Nautical Publication**

> **Information** feature (see clauses X.X), with complex attributes **information** and/or **textual description** (see clause X.X), or if the information is considered essential for safe navigation, using a **Caution Area** feature (see clause X.X).
>
> - Two-way routes may be included with other routeing measures such as traffic separation schemes to comprise a complete traffic routeing system. To encode the relationship between routeing measures, the **C_AGGR** defining each routeing measure within the system (or the relevant feature if the routeing measure consists of a single feature) may be aggregated using **C_AGGR** to form a hierarchical relationship (see clause X.X). The individual elements comprising different routeing measures must not be aggregated into a single **C_AGGR**.
>
> Distinction: Deep Water route part; recommended traffic lane part; traffic separation scheme lane part.

15.9 Recommended direction of traffic flow

<u>IHO Definition:</u> **RECOMMENDED TRAFFIC LANE PART**. Recommended direction of traffic flow is a traffic flow pattern indicating a recommended directional movement of traffic where it is impractical or unnecessary to adopt an established direction of traffic flow. (IHO Dictionary – S-32). A recommended traffic lane part is an area of a recommended direction of traffic control area within which traffic flow is generally along one bearing.		

<u>S-101 Geo Feature:</u> Recommended traffic lane part (RCTLPT)		

<u>Primitives:</u> Point, Surface		

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Orientation			C	1,1
Orientation uncertainty			(S) RE	0,1
Orientation value	(ORIENT)		(S) RE	1,1
Status	(STATUS)	1 : permanent 6 : reserved 9 : mandatory	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
~~Recording date~~	~~(RECDAT)~~		~~DA~~	~~0,1~~
~~Recording indication~~	~~(RECIND)~~	~~ISO 8601:1988~~	~~TE~~	~~0,1~~
~~Source indication~~			~~C~~	~~0,*~~
~~Authority~~			~~(S) TE~~	~~1,1~~
~~Nationality~~			~~(S) TE~~	~~1,1~~
~~ID code~~			~~(S) TE~~	~~0,1~~
~~Source~~			~~(S) TE~~	~~0,1~~
~~Source date~~	~~(SORDAT)~~	~~ISO 8601:1988~~	~~(S) DA~~	~~1,1~~

<u>INT 1 Reference:</u> M 26.1-2

15.9.1 Recommended traffic lane part (see S-4 – B-435.5)

IMO-designated recommended directions of traffic flow are listed in IMO publication "*Ships' Routeing*" Part E. Several hydrographic offices, in consultation with their Ministries of Transport, have added recommended directions in areas such as the outer approaches to major ports in order to show the best routes for crossing traffic or to minimise the risk of head-on encounters.

The feature **Recommended Traffic Lane Part** must be used, where required, to encode areas with a

recommended direction of traffic flow which is generally along one bearing:

- between two TSS (INT1 – M 26.1);
- in the entrance area of a TSS; or
- along the outside of a Deep Water route (INT1 – M 26.2).

Remarks:

- When the area is not defined, a point feature should be encoded.
- The orientation of the recommended traffic lane part is defined by the centreline of the part and is related to the general direction of traffic flow in the recommended traffic lane.

Distinction:

15.10 Traffic separation scheme lane part

<table>
<tr><td colspan="5">IHO Definition: TRAFFIC SEPARATION SCHEME LANE PART. A traffic separation scheme is a scheme which aims to reduce the risk of collision in congested and/or converging areas by separating traffic moving in opposite, or nearly opposite, directions. (IHO Dictionary – S-32).

A traffic lane is an area within defined limits in which one-way traffic flow is established. Natural obstacles, including those forming separation zones, may constitute a boundary. (IHO Dictionary – S-32).

A traffic separation scheme lane part is an area of a traffic lane in which the direction of flow of traffic is generally along one bearing. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.187, November 2000).</td></tr>
<tr><td colspan="5"><u>S-101 Geo Feature:</u> Traffic separation scheme lane part (TSSLPT)</td></tr>
<tr><td colspan="5"><u>Primitives:</u> Surface</td></tr>
<tr><td colspan="2"><i>Real World</i></td><td colspan="2"><i>Paper Chart Symbol</i></td><td><i>ECDIS Symbol</i></td></tr>
</table>
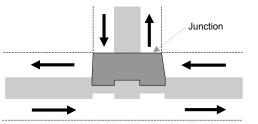
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of traffic separation scheme	(CATTSS)	1 : IMO – adopted 2 : not IMO – adopted	EN	0,1
Exposition of sounding	(EXPSOU)	1 : within the range of depth of the surrounding depth area 2 : shoaler than the range of depth of the surrounding depth area 3 : deeper than the range of depth of the surrounding depth area	EN	0,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Orientation			C	0,1
Orientation uncertainty			(S) RE	0,1
Orientation value	(ORIENT)		(S) RE	1,1
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted	EN	0,*

		22 : removal of historical artefacts prohibited 23 : cargo transhipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 27 : speed restricted		
Status	(STATUS)	1 : permanent 3 : recommended 6 : reserved 9 : mandatory 19 : buoyed	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
~~Recording date~~	~~(RECDAT)~~	~~ISO 8601:1988~~	~~DA~~	~~0,1~~
~~Recording indication~~	~~(RECIND)~~		~~TE~~	~~0,1~~
~~Source indication~~			~~C~~	~~0,*~~
~~Authority~~			~~(S) TE~~	~~1,1~~
~~Nationality~~			~~(S) TE~~	~~1,1~~
~~ID code~~			~~(S) TE~~	~~0,1~~
~~Source~~			~~(S) TE~~	~~0,1~~
~~Source date~~	~~(SORDAT)~~	~~ISO 8601:1988~~	~~(S) DA~~	~~1,1~~

Comment [j88]: S-57 Extension 06/01.

INT 1 Reference: M 20.1-3, 22

15.10.1 Traffic separation scheme lanes (see S-4 – B-435.1)

A complete traffic separation scheme lane consists of one or more areas within which the flow of traffic follows one defined direction. If it is required to encode these areas, this must be done using the feature **Traffic Separation Scheme Lane Part**.

Remarks:
- The complex attribute **orientation** is mandatory for all **Traffic Separation Scheme Lane Part** features, unless the part is a junction.
- At junctions, other than crossings and roundabouts, a separate **Traffic Separation Scheme Lane Part** feature must be encoded. For this feature, the complex attribute **orientation** must be omitted, in order to avoid implying that one lane has priority over another (see INT1 – M22). Warning text may be encoded using the complex attributes **information** or **textual description**. In some cases, a precautionary area is established where routes meet or cross (see clause X.X).

Junction

- The orientation of the traffic separation scheme lane part is defined by the centreline of the part and is related to the general direction of traffic flow in the traffic separation lane.

Distinction: Recommended traffic lane part; traffic separation line; traffic separation scheme boundary; traffic separation scheme crossing; traffic separation scheme roundabout; traffic separation zone.

15.11   Traffic separation zone

IHO Definition: **TRAFFIC SEPARATION ZONE**.   A traffic separation scheme is a scheme which aims to reduce the risk of collision in congested and/or converging areas by separating traffic moving in opposite, or nearly opposite, directions. (IHO Dictionary – S-32).

A traffic separation zone is a zone separating the lanes in which ships are proceeding in opposite or nearly opposite directions; or separating traffic lanes designated for particular classes of ships proceeding in the same direction (IMO Ships Routing, 6th Edition).

S-101 Geo Feature: Traffic separation zone (TSEZNE)

Primitives: Surface

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Category of traffic separation scheme	(CATTSS)	1 : IMO – adopted 2 : not IMO – adopted	EN	0,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Status	(STATUS)	1 : permanent 3 : recommended 9 : mandatory 19 : buoyed	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

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

INT 1 Reference: M 13, 20.1, 20.3, 21

15.11.1 Traffic separation zones (see S-4 – B-435.1 and B-436.3)

The feature **Traffic Separation Zone** must only be used to encode the separation areas between two traffic lanes, or of one traffic lane and one inshore traffic zone, or to encode the centre part of a roundabout.

Remarks:
• No remarks.

15.12   Traffic separation scheme boundary

<u>IHO Definition:</u> **TRAFFIC SEPARATION SCHEME BOUNDARY**. A traffic separation scheme is a scheme which aims to reduce the risk of collision in congested and/or converging areas by separating traffic moving in opposite, or nearly opposite, directions. (IHO Dictionary – S-32).	

The boundary of a traffic separation scheme is the outer limit of a traffic lane part or a traffic separation scheme roundabout. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.185, November 2000).

<u>S-101 Geo Feature:</u> **Traffic separation scheme boundary (TSSBND)**

<u>Primitives:</u> Point, Surface

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of traffic separation scheme	(CATTSS)	1 : IMO – adopted 2 : not IMO – adopted	EN	0,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Status	(STATUS)	1 : permanent 3 : recommended 9 : mandatory 19 : buoyed	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
~~Recording date~~	~~(RECDAT)~~	~~ISO 8601:1988~~	~~DA~~	~~0,1~~
~~Recording indication~~	~~(RECIND)~~		~~TE~~	~~0,1~~
~~Source indication~~			~~C~~	~~0,*~~
~~Authority~~			~~(S) TE~~	~~1,1~~
~~Nationality~~			~~(S) TE~~	~~1,1~~
~~ID code~~			~~(S) TE~~	~~0,1~~
~~Source~~			~~(S) TE~~	~~0,1~~
~~Source date~~	~~(SORDAT)~~	~~ISO 8601:1988~~	~~(S) DA~~	~~1,1~~

Comment [j90]: S-57 Extension 06/01.

<u>INT 1 Reference:</u> M 15

15.12.1 Traffic separation scheme boundaries (see S-4 – B-435.1)

The feature **Traffic Separation Scheme Boundary** must only be used to encode the outer limits of traffic lanes or traffic separation scheme roundabouts.

<u>Remarks:</u>
- **Traffic Separation Scheme Boundary** must not be used to encode the boundary between a traffic separation scheme lane or roundabout and a traffic separation zone; or a traffic separation zone and an

inshore traffic zone.

<u>Distinction:</u> Traffic separation line; traffic separation scheme crossing; traffic separation scheme lane part; traffic separation scheme roundabout; traffic separation zone.

15.13   Precautionary area

<table>
<tr><td colspan="6">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).</td></tr>
<tr><td colspan="6">S-101 Geo Feature: Precautionary area (PRCARE)</td></tr>
<tr><td colspan="6">Primitives: Point, Surface</td></tr>
</table>

Real World	Paper Chart Symbol		ECDIS Symbol		

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 14 : area to be avoided 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transhipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 27 : speed restricted	EN	0,*
Status	(STATUS)	1 : permanent 9 : mandatory 19 : buoyed	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1

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

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

INT 1 Reference: M 16, 24

15.13.1 Precautionary areas (see S-4 – B-435.2)

Precautionary areas are commonly designated by IMO for certain areas of converging or crossing traffic, usually in association with traffic separation schemes. If it is required to encode such areas, it must be done using the feature **Precautionary Area**.

Remarks:
- At least one of the complex attributes **information** or **textual description** must be used to encode the relevant cautionary information.
- A **Precautionary Area** feature may overlap other features encoded for the traffic separation scheme (e.g. **Traffic Separation Scheme Roundabout**, **Traffic Separation Scheme Lane Part, Traffic Separation Scheme Crossing**).

Distinction: Caution area; inshore traffic zone; restricted area; all traffic separation scheme elements of type area.

15.14   Deep water route centreline

<table>
<tr><td colspan="6">IHO Definition: DEEP WATER ROUTE CENTRELINE. A Deep Water route is a route in a designated area, within defined limits, which has been accurately surveyed for clearance of sea bottom and submerged obstacles to a minimum indicated depth of water. (IHO Dictionary – S-32).

The Deep Water route centreline indicates the centreline of a route, the width of which is not explicitly defined. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.49, November 2000).</td></tr>
<tr><td colspan="6"><u>S-101 Geo Feature:</u> Deep water route centerline (DWRTCL)</td></tr>
<tr><td colspan="6"><u>Primitives:</u> Curve</td></tr>
<tr><td colspan="2"><i>Real World</i></td><td colspan="2"><i>Paper Chart Symbol</i></td><td colspan="2"><i>ECDIS Symbol</i></td></tr>
</table>

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity	
Category of recommended track	(CATTRK)	1 : based on a system of fixed marks 2 : not based on a system of fixed marks	EN	1,1	
Depth range minimum value	(DRVAL1)		RE	0,1	
Feature name			C	0,*	
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1	
Display name			(S) BO	0,1	
Language		ISO 639-3	(S) TE	0,1	
Name	(OBJNAM)		(S) TE	1,1	
Fixed date range			C	0,1	
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1	
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1	
Orientation			C	1,1	
Orientation uncertainty			(S) RE	0,1	
Orientation value	(ORIENT)		(S) RE	1,1	
Quality of sounding measurement	(QUASOU)	1 : depth known 2 : depth or least depth unknown 3 : doubtful sounding 4 : unreliable sounding 6 : least depth known 7 : least depth unknown, safe clearance at value shown	EN	0,*	**Comment [j92]:** MD8 – 4.Co.11 and 4.Cl.9.
Sounding uncertainty	(SOUACC)		RE	0,1	
Status	(STATUS)	1 : permanent 3 : recommended 6 : reserved 9 : mandatory	EN	0,*	
Technique of sounding measurement	(TECSOU)	1 : found by echo-sounder 2 : found by side scan sonar 3 : found by multi-beam	EN	0,*	

		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 11 : satellite imagery 13 : swept by side-scan sonar		
Traffic	(TRAFIC)	1 : inbound 2 : outbound 3 : one-way 4 : two-way	EN	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: M 27.3

15.14.1 Deep Water routes centrelines (see S-4 – B-435.3)

A complete Deep Water route (DW) consists of one or more areas within which the flow of traffic either follows one defined direction for one-way traffic, or follows one defined direction and its reciprocal for two-way traffic.

If it is required to encode the centreline of a Deep Water route, the width of which is not explicitly defined, it must be done using the feature **Deep Water Route Centreline**.

Remarks:
- In the case of a deep water route centreline, only one value of orientation is encoded (in the complex attribute **orientation**); the other value can be deduced (i.e. the value in **orientation** (**orientation value**) + 180 degrees). The value of orientation encoded on the complex attribute **orientation** (**orientation value**) should be the value of the bearing from seaward. If it is not possible to define a seaward direction, the value that is less than 180° should be used.
- When the traffic flow is one way (attribute **traffic** = *1*, *2* or *3*), the resultant direction of the line (accounting for the direction of digitising and any subsequent reversal of the line) associated with the **Deep Water Route Centreline** must be the same as the direction of traffic flow, in order to ensure the correct representation in the ECDIS of the direction to be followed.
- The complex attribute **feature name** should only be used if the individual feature is not aggregated in a collection feature or is the most representative feature in a collection feature (see clause X.X).
- To encode a complete Deep Water route, the **Deep Water Route Centreline**, **Deep Water Route Part** features, and the navigational aids features (if they are stated in the regulation defining the DW), may be aggregated using the collection feature **C_AGGR** (see clause X.X). Where it is required to indicate the name of an aggregated DW, this should be done using a **Sea Area/Named Water Area** feature (see clause X.X), or by populating **feature name** for the most representative feature in the DW. Where it is required to populate textual information for the DW, this should be done using a **Nautical Publication Information** feature (see clauses X.X), with complex attributes **information** and/or **textual description** (see clause

X.X), or if the information is considered essential for safe navigation, using a **Caution Area** feature (see clause X.X).

- Deep Water routes, unlike dredged areas, are likely to be designated in offshore waters outside the immediate supervision of harbour authorities (although some do form the outer approaches to deep water ports). No least depth quoted can be fully guaranteed in most cases. Least depths within the route should be encoded by soundings as elsewhere on the ENC dataset so that the navigator will not assume that the depths are continually monitored. However, in those cases where a hydrographic authority feels confident to guarantee the existence of a minimum depth of water in a DW route, it must be populated using the attribute **depth range minimum value**.

- Deep water routes may be included with other routeing measures such as traffic separation schemes to comprise a complete traffic routeing system. To encode the relationship between routeing measures, the **C_AGGR** defining each routeing measure within the system (or the relevant feature if the routeing measure consists of a single feature) may be aggregated using **C_AGGR** to form a hierarchical relationship (see clause X.X). The individual elements comprising different routeing measures must not be aggregated into a single **C_AGGR**.

- IMO-designated Deep Water routes are listed in IMO publication "*Ships' Routeing*" Part C.

<u>Distinction:</u> Deep Water route part.

15.15 Deep water route part

<table>
<tr><td colspan="2">IHO Definition: DEEP WATER ROUTE PART. A Deep Water route is a route in a designated area, within defined limits, which has been accurately surveyed for clearance of sea bottom and submerged obstacles to a minimum indicated depth of water. (IHO Dictionary – S-32).

A Deep Water route part is an area of a Deep Water route in which the direction of flow of traffic is uniform.</td></tr>
<tr><td colspan="2">S-101 Geo Feature: Deep water route part (DWRTPT)</td></tr>
<tr><td colspan="2">Primitives: Surface</td></tr>
</table>

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Depth range minimum value	(DRVAL1)		RE	1,1
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Orientation			C	1,1
Orientation uncertainty			(S) RE	0,1
Orientation value	(ORIENT)		(S) RE	1,1
Quality of sounding measurement	(QUASOU)	1 : depth known 2 : depth or least depth unknown 3 : doubtful sounding 4 : unreliable sounding 6 : least depth known 7 : least depth unknown, safe clearance at value shown	EN	0,*
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake ~~14 : area to be avoided~~ 16 : discharging prohibited 17 : discharging restricted	EN	0,*

Comment [j93]: MD8 – 4.Co.11 and 4.Cl.9.

		18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transhipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 27 : speed restricted		
Sounding uncertainty	(SOUACC)		RE	0,1
Status	(STATUS)	1 : permanent 3 : recommended 6 : reserved 9 : mandatory 19 : buoyed	EN	0,*
Technique of sounding measurement	(TECSOU)	1 : found by echo-sounder 2 : found by side scan sonar 3 : found by multi-beam 5 : found by lead-line 6 : swept by wire-drag 7 : found by laser 8 : swept by vertical acoustic system 9 : found by electromagnetic sensor 11 : satellite imagery 13 : swept by side-scan sonar	EN	0,*
Traffic	(TRAFIC)	1 : inbound 2 : outbound 3 : one-way 4 : two-way	EN	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

Comment [j94]: S-57 Extension 06/01.

INT 1 Reference: M 27.1-2

15.15.1 Deep Water route parts (see S-4 – B-435; B-435.3 and B-436.3)

A complete Deep Water route (DW) consists of one or more areas within which the flow of traffic either follows

one defined direction for one-way traffic, or follows one defined direction and its reciprocal for two-way traffic.

If it is required to encode these areas, this must be done using the feature **Deep Water Route Part**.

Remarks:
- The complex attribute **feature name** should only be used if the individual feature is not aggregated in a collection feature or is the most representative feature in a collection feature (see clause X.X).
- The route must be covered by **Depth Area** features.
- A Deep Water route part may overlap a **Traffic Separation Scheme Lane Part** feature.
- To encode a complete Deep Water route, the **Deep Water Route Centreline**, **Deep Water Route Part** features, and the navigational aids features (if they are stated in the regulation defining the DW), may be aggregated using the collection feature **C_AGGR** (see clause X.X). Where it is required to indicate the name of an aggregated DW, this should be done using a **Sea Area/Named Water Area** feature (see clause X.X), or by populating **feature name** for the most representative feature in the DW. Where it is required to populate textual information for the DW, this should be done using a **Nautical Publication Information** feature (see clauses X.X), with complex attributes **information** and/or **textual description** (see clause X.X), or if the information is considered essential for safe navigation, using a **Caution Area** feature (see clause X.X).
- Deep Water routes, unlike dredged areas, are likely to be designated in offshore waters outside the immediate supervision of harbour authorities (although some do form the outer approaches to deep water ports). No least depth quoted can be fully guaranteed in most cases. Least depths within the route should be encoded by soundings as elsewhere on the ENC dataset so that the navigator will not assume that the depths are continually monitored. However, in those cases where a hydrographic authority feels confident to guarantee the existence of a minimum depth of water in a DW route, it must be populated using the attribute **depth range minimum value**.
- The orientation of the Deep Water route part is defined by the centreline of the part and is related to the general direction of traffic flow in the Deep Water route.
- Deep water routes may be included with other routeing measures such as traffic separation schemes to comprise a complete traffic routeing system. To encode the relationship between routeing measures, the **C_AGGR** defining each routeing measure within the system (or the relevant feature if the routeing measure consists of a single feature) may be aggregated using **C_AGGR** to form a hierarchical relationship (see clause X.X). The individual elements comprising different routeing measures must not be aggregated into a single **C_AGGR**.
- IMO-designated Deep Water routes are listed in IMO publication "*Ships' Routeing*" Part C.

Distinction: Deep Water route centreline; two-way route part.

15.16   Traffic separation line

IHO Definition: **TRAFFIC SEPARATION LINE**. A traffic separation scheme is a scheme which aims to reduce the risk of collision in congested and/or converging areas by separating traffic moving in opposite, or nearly opposite, directions. (IHO Dictionary – S-32).

A traffic separation line is a line separating the lanes in which ships are proceeding in opposite, or nearly opposite directions; or separating traffic lanes designated for particular classes of ships proceeding in the same direction. (IMO Ships Routing, 6th Edition).

S-101 Geo Feature: Traffic separation line (TSSLNE)

Primitives: Curve

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Category of traffic separation scheme	(CATTSS)	1 : IMO – adopted 2 : not IMO – adopted	EN	0,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Status	(STATUS)	1 : permanent 3 : recommended 9 : mandatory 19 : buoyed	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

Comment [j95]: S-57 Extension 06/01.

INT 1 Reference: M 12

15.16.1 Traffic separation line (see S-4 – B-435.1 and B-436.3)

The feature **Traffic Separation Line** must only be used to encode the common boundary of two traffic lanes, or of one traffic lane and one inshore traffic zone.

Remarks:
- No remarks.

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).

S-101 Geo Feature: Inshore traffic zone **(ISTZNE)**

Primitives: **Surface**

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Category of traffic separation scheme	(CATTSS)	1 : IMO – adopted 2 : not IMO – adopted	EN	0,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transhipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 27 : speed restricted	EN	0,*
Status	(STATUS)	1 : permanent 3 : recommended 6 : reserved 9 : mandatory 16 : watched 17 : un-watched	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*

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

INT 1 Reference: M 25.1, 25.2

15.17.1 Inshore traffic zones (see S-4 – B-435.1)

The feature **Inshore Traffic Zone** must only be used to encode the designated area between the landward boundary of a traffic separation scheme and the adjacent coast.

Remarks:
- Inshore traffic zones are used to exclude most classes of through traffic. Traffic in an inshore traffic zone is separated from traffic in the adjacent traffic lane by either a separation zone or a separation line (see clauses X.X and X.X). An inshore traffic zone may be adjacent to a precautionary area (see clause X.X).

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

<table>
<tr><td colspan="6">IHO Definition: TRAFFIC SEPARATION SCHEME CROSSING. A traffic separation scheme is a scheme which aims to reduce the risk of collision in congested and/or converging areas by separating traffic moving in opposite, or nearly opposite, directions. (IHO Dictionary – S-32).

A traffic separation scheme crossing is a defined area where traffic lanes cross. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.186, November 2000).</td></tr>
<tr><td colspan="6"><u>S-101 Geo Feature:</u> Traffic separation scheme crossing (TSSCRS)</td></tr>
<tr><td colspan="6"><u>Primitives:</u> Surface</td></tr>
<tr><td colspan="2"><i>Real World</i></td><td colspan="2"><i>Paper Chart Symbol</i></td><td colspan="2"><i>ECDIS Symbol</i></td></tr>
</table>

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of traffic separation scheme	(CATTSS)	1 : IMO – adopted 2 : not IMO – adopted	EN	0,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transhipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 27 : speed restricted	EN	0,*
Status	(STATUS)	1 : permanent 3 : recommended 6 : reserved 9 : mandatory	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*

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

INT 1 Reference: M 23

15.18.1 Traffic separation scheme crossing (see S-4 – B-435.1)

The feature **Traffic Separation Scheme Crossing** must only be used to encode the area where at least four traffic lanes cross.

Remarks:
- Junctions other than crossings and roundabouts should be encoded using the feature **Traffic Separation Scheme Lane Part** (see clause X.X).
- A **Traffic Separation Scheme Crossing** feature must not overlap a **Traffic Separation Zone** feature at its centre.
- In some cases, a precautionary area is established where routes meet or cross (see clause X.X).

Distinction: Traffic separation line; traffic separation scheme boundary; traffic separation scheme lane part; traffic separation scheme roundabout; traffic separation zone.

15.19   Traffic separation scheme roundabout

<table>
<tr><td colspan="5">

<u>IHO Definition:</u> **TRAFFIC SEPARATION SCHEME ROUNDABOUT**. A traffic separation scheme is a scheme which aims to reduce the risk of collision in congested and/or converging areas by separating traffic moving in opposite, or nearly opposite, directions. (IHO Dictionary – S-32).

A roundabout is a traffic separation scheme in which traffic moves in a counter-clockwise direction around a specified point or zone. (IHO Dictionary – S-32).

</td></tr>
<tr><td colspan="5">

<u>S-101 Geo Feature:</u> **Traffic separation scheme roundabout (TSSRON)**

</td></tr>
<tr><td colspan="5">

<u>Primitives:</u> **Surface**

</td></tr>
</table>

Real World	*Paper Chart Symbol*		*ECDIS Symbol*	

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of traffic separation scheme	(CATTSS)	1 : IMO – adopted 2 : not IMO – adopted	EN	0,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transhipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 27 : speed restricted	EN	0,*
Status	(STATUS)	1 : permanent 3 : recommended 6 : reserved 9 : mandatory	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*

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

INT 1 Reference: M 21

15.19.1 Traffic separation scheme roundabout (see S-4 – B-435.1)

The feature **Traffic Separation Scheme Roundabout** must only be used to encode the area in which traffic moves in a counter clockwise direction around a specified point or zone.

Remarks:
- Junctions other than crossings and roundabouts should be encoded using the feature **Traffic Separation Scheme Lane Part** (see clause X.X).
- A **Traffic Separation Scheme Roundabout** feature must not overlap a **Traffic Separation Zone** feature at its centre.
- In some cases, a precautionary area is established where routes meet or cross (see clause X.X).

Distinction: Traffic separation line; traffic separation scheme boundary; traffic separation scheme crossing; traffic separation scheme lane part; traffic separation zone.

15.20   Archipelagic Sea Lane

<table>
<tr><td colspan="5">IHO Definition: ARCHIPELAGIC SEA LANE. Sea lanes designated by an archipelagic State for the passage of ships and aircraft. (IHO Dictionary – S-32).</td></tr>
<tr><td colspan="5">S-101 Geo Feature: Archipelagic sea lane (ARCSLN)</td></tr>
<tr><td colspan="5">Primitives: Surface</td></tr>
<tr><td colspan="2"><i>Real World</i></td><td colspan="2"><i>Paper Chart Symbol</i></td><td><i>ECDIS Symbol</i></td></tr>
</table>

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

INT 1 Reference: M 17

15.20.1 Archipelagic Sea Lane (see S-4 – B-435.10)

Article 53 of the United Nations Convention on the Law of the Sea (UNCLOS) states that:
"an archipelagic State may designate sea lanes ..., suitable for the continuous and expeditious passage of foreign ships ... through ... its archipelagic waters and the adjacent Territorial Sea. ... All ships ... enjoy the right of archipelagic sea lanes passage in such sea lanes ... [which] include all normal passage routes used as

routes for international navigation … through archipelagic waters". (Note: references to aircraft and air routes in UNCLOS have been omitted in these extracts from Article 53). (IHO S-4 B-435.10, C-51 Appendix 2 Part II).

Any archipelagic State which wishes to designate Archipelagic Sea Lanes (ASL) must propose them to IMO for adoption as ASL including all normal passage routes and navigational channels as required by UNCLOS. ASL are adopted by IMO in accordance with the relevant provisions of UNCLOS.

If it is required to encode an Archipelagic Sea Lane, it must be done using **Archipelagic Sea Lane** and/or **Archipelagic Sea Lane Axis** (see clause X.X) features, and possibly navigational aids features.

The unique character of Archipelagic Sea Lanes (ASLs) is specified by UNCLOS Article 53 and Part H, General Provision of IMO Ships Routing. Further information is provided in the IHO publication C-51 (Manual on Technical Aspects of the United Nations Convention on the Law of the Sea).

The encoding of relationships between these features is defined in clause X.X.

Remarks:
- The feature **Archipelagic Sea Lane** encodes the area of an Archipelagic Sea Lane.
- In some cases only accurate information on the axes (**Archipelagic Sea Lane Axis**, see clause X.X) may be available and in such cases the extents of the ASL (**Archipelagic Sea Lane**) may not be able to be encoded.
- To encode an Archipelagic Sea Lane (ASL) system, the **Archipelagic Sea Lane, Archipelagic Sea Lane Axis** features, and any navigational aids features (if they are stated in the regulation defining the ASL), should be aggregated using the feature **C_AGGR** (see clause X.X). Where it is required to indicate the name of the ASL system, this should be done using a **Sea Area/Named Water Area** feature (see clause X.X), or by populating the complex attribute **feature name** for the most representative feature in the ASL system. Where it is required to populate textual information for the ASL system, this should be done using a **Nautical Publication Information** feature (see clauses X.X), with complex attributes **information** and/or **textual description** (see clause X.X), or if the information is considered essential for safe navigation, using a **Caution Area** feature (see clause X.X).
- Traffic within an ASL is not separated, except in any traffic separation schemes which may be designated in an ASL for the safe passage of ships.

Distinction: Administrative area; Archipelagic Sea Lane axis; caution area; fairway; inshore traffic zone; recommended traffic lane part; restricted area; submarine transit lane; traffic separation scheme lane part; traffic separation zone; two-way route part.

15.21   Archipelagic Sea Lane Axis

<table>
<tr><td colspan="6">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.</td></tr>
<tr><td colspan="6">S-101 Geo Feature: Archipelagic sea lane axis (ASLXIS)</td></tr>
<tr><td colspan="6">Primitives: Curve</td></tr>
<tr><td colspan="2"><i>Real World</i></td><td colspan="2"><i>Paper Chart Symbol</i></td><td colspan="2"><i>ECDIS Symbol</i></td></tr>
<tr><td colspan="2">S-101 Attribute</td><td>S-57 Acronym</td><td>Allowable Encoding Value</td><td>Type</td><td>Multiplicity</td></tr>
<tr><td colspan="2">Feature name</td><td></td><td></td><td>C</td><td>0,*</td></tr>
<tr><td colspan="2">Category of name</td><td></td><td>1 : official name
2 : alternate name
3 : common name
4 : short name
5 : display name</td><td>(S) EN</td><td>0,1</td></tr>
<tr><td></td><td>Display name</td><td></td><td></td><td>(S) BO</td><td>0,1</td></tr>
<tr><td></td><td>Language</td><td></td><td>ISO 639-3</td><td>(S) TE</td><td>0,1</td></tr>
<tr><td></td><td>Name</td><td>(OBJNAM)</td><td></td><td>(S) TE</td><td>1,1</td></tr>
<tr><td colspan="2">Fixed date range</td><td></td><td></td><td>C</td><td>0,1</td></tr>
<tr><td></td><td>Date end</td><td>(DATEND)</td><td>ISO 8601:1988</td><td>(S) DA</td><td>0,1</td></tr>
<tr><td></td><td>Date start</td><td>(DATSTA)</td><td>ISO 8601:1988</td><td>(S) DA</td><td>0,1</td></tr>
<tr><td colspan="2">Nationality</td><td>(NATION)</td><td></td><td>TE</td><td>1,1</td></tr>
<tr><td colspan="2">Information</td><td></td><td></td><td>C</td><td>0,*</td></tr>
<tr><td></td><td>Language</td><td></td><td>ISO 639-3</td><td>(S) TE</td><td>0,1</td></tr>
<tr><td></td><td>Text</td><td>(INFORM)</td><td></td><td>(S) TE</td><td>1,1</td></tr>
<tr><td colspan="2">Textual description</td><td></td><td></td><td>C</td><td>0,*</td></tr>
<tr><td></td><td>File reference</td><td>(TXTDSC)</td><td></td><td>(S) TE</td><td>1,1</td></tr>
<tr><td></td><td>Language</td><td></td><td>ISO 639-3</td><td>(S) TE</td><td>0,1</td></tr>
<tr><td colspan="2">Scale minimum</td><td>(SCAMIN)</td><td>See clause X.X</td><td>IN</td><td>0,1</td></tr>
<tr><td colspan="2">Recording date</td><td>(RECDAT)</td><td>ISO 8601:1988</td><td>DA</td><td>0,1</td></tr>
<tr><td colspan="2">Recording indication</td><td>(RECIND)</td><td></td><td>TE</td><td>0,1</td></tr>
<tr><td colspan="2">Source indication</td><td></td><td></td><td>C</td><td>0,*</td></tr>
<tr><td></td><td>Authority</td><td></td><td></td><td>(S) TE</td><td>1,1</td></tr>
<tr><td></td><td>Nationality</td><td></td><td></td><td>(S) TE</td><td>1,1</td></tr>
<tr><td></td><td>ID code</td><td></td><td></td><td>(S) TE</td><td>0,1</td></tr>
<tr><td></td><td>Source</td><td></td><td></td><td>(S) TE</td><td>0,1</td></tr>
<tr><td></td><td>Source date</td><td>(SORDAT)</td><td>ISO 8601:1988</td><td>(S) DA</td><td>1,1</td></tr>
<tr><td colspan="6">INT 1 Reference: M 17

15.21.1 Archipelagic Sea Lane Axis (see S-4 – B-435.10)

Article 53 of the United Nations Convention on the Law of the Sea (UNCLOS) states that:
"an archipelagic State may designate sea lanes ..., suitable for the continuous and expeditious passage of foreign ships ... through ... its archipelagic waters and the adjacent Territorial Sea. ... All ships ... enjoy the</td></tr>
</table>

right of archipelagic sea lanes passage in such sea lanes ... [which] include all normal passage routes used as routes for international navigation … through archipelagic waters". (Note: references to aircraft and air routes in UNCLOS have been omitted in these extracts from Article 53). (IHO S-4 B-435.10, C-51 Appendix 2 Part II).

The axis line of an Archipelagic Sea lane (ASL) is encoded in ENCs only for the purpose of defining the sea lane. The axis line does not indicate any routes or recommended tracks as defined in IMO publication "*Ships' Routeing*" Part A.

Remarks:
- To encode an Archipelagic Sea Lane (ASL) system, the **Archipelagic Sea Lane**, **Archipelagic Sea Lane Axis** features, and any navigational aids features (if they are stated in the regulation defining the ASL), should be aggregated using the feature **C_AGGR** (see clause X.X). Where it is required to indicate the name of the ASL system, this should be done using a **Sea Area/Named Water Area** feature (see clause X.X), or by populating the complex attribute **feature name** for the most representative feature in the ASL system. Where it is required to populate textual information for the ASL system, this should be done using a **Nautical Publication Information** feature (see clauses X.X), with complex attributes **information** and/or **textual description** (see clause X.X), or if the information is considered essential for safe navigation, using a **Caution Area** feature (see clause X.X).

Distinction: Administrative area; Archipelagic Sea Lane; caution area; Deep Water route centreline; fairway; inshore traffic zone; navigation line; recommended route centreline; recommended track; recommended traffic lane part; restricted area; submarine transit lane; traffic separation scheme lane part; traffic separation line; traffic separation zone; two-way route part.

15.22   Radio calling-in point

IHO Definition: **RADIO CALLING-IN POINT**. A designated position at which vessels are required to report to a Traffic Control Centre. Also called reporting point or radio reporting point. (IHO Dictionary – S-32).
S-101 Geo Feature: Radio calling-in point (RDOCAL)
Primitives: Point, Curve

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Call sign	(CALSGN)		TE	0,1
Communication channel	(COMCHA)		TE	0,*
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Orientation			C	0,2
Orientation uncertainty			(S) RE	0,1
Orientation value	(ORIENT)		(S) RE	1,1
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Status	(STATUS)	1 : permanent 3 : recommended 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 9 : mandatory	EN	0,*
Traffic	(TRAFIC)	1 : inbound 2 : outbound 3 : one-way 4 : two-way	EN	1,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1

Comment [A96]: S-57 Extension 06/01.

Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
— Authority			(S) TE	1,1
— Nationality			(S) TE	1,1
— ID code			(S) TE	0,1
— Source			(S) TE	0,1
— Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: M 40.1-2

15.22.1 Radio calling-in (reporting) points (see S-4 – B-488.1 and B-488.2)

Radio reporting points, also called radio calling-in points, have been established in certain busy waterways and port approaches to assist traffic control. On passing these points or crossing a defined line vessels are required to report on VHF to a Traffic Control Centre.

If it is required to encode a radio reporting point or line, it must be done using the feature **Radio Calling-in Point**.

Remarks:
- Each **Radio Calling-in Point** feature of type point must carry at least one orientation. If it is required to encode the reciprocal orientation, to indicate that a bearing and its opposite apply to a **Radio Calling-in Point** feature, it must be done using attribute **traffic =** *4* (two-way). If the same position is used for another orientation (not opposite) of traffic flow, a second **orientation** complex attribute must be encoded.
- The complex attribute **feature name**, sub-attribute **name** is used to encode the name and/or alphanumeric designator of the **Radio Calling-in Point**.
- The complex attributes **information** or **textual description** are used to provide additional information, where required. For example, if the requirement to report by radio relates to certain classes of vessels only.
- **Radio Calling-in Point** features of type curve must be encoded such that resultant direction of the line (accounting for the direction of digitising and any subsequent reversal of the curve) is related such that the direction of traffic that is required to report is to the right. For curve features, it is not required to populate **orientation**.
- If it is required to encode the area of a Vessel Traffic Service (VTS) containing radio reporting points or requiring periodic position reporting, this should be done using the feature **Vessel Traffic Service Area** (see clause X.X). The **Vessel Traffic Service Area** and any associated **Radio Calling-in Point** points may be aggregated using the collection feature **C_AGGR** (see clause X.X).
- Each VHF-channel should be indicated, using the attribute **communication channel** (see clause X.X).

Distinction: Radio station; pilot boarding place; Vessel Traffic Service area.

15.23   Ferry route

<table>
<tr><td colspan="5">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).</td></tr>
<tr><td colspan="5">**S-101 Geo Feature:** Ferry route (FERYRT)</td></tr>
<tr><td colspan="5">**Primitives:** Curve, Surface</td></tr>
<tr><td colspan="2">*Real World*</td><td colspan="1">*Paper Chart Symbol*</td><td colspan="2">*ECDIS Symbol*</td></tr>
<tr><td>**S-101 Attribute**</td><td>**S-57 Acronym**</td><td>**Allowable Encoding Value**</td><td>**Type**</td><td>**Multiplicity**</td></tr>
<tr><td>Category of ferry</td><td>(CATFRY)</td><td>1 : "free-moving" ferry
2 : cable ferry
3 : ice ferry
5 : high speed ferry</td><td>EN</td><td>1,*</td></tr>
<tr><td>Feature name</td><td></td><td></td><td>C</td><td>0,*</td></tr>
<tr><td>Category of name</td><td></td><td>1 : official name
2 : alternate name
3 : common name
4 : short name
5 : display name</td><td>(S) EN</td><td>0,1</td></tr>
<tr><td>Display name</td><td></td><td></td><td>(S) BO</td><td>0,1</td></tr>
<tr><td>Language</td><td></td><td>ISO 639-3</td><td>(S) TE</td><td>0,1</td></tr>
<tr><td>Name</td><td>(OBJNAM)</td><td></td><td>(S) TE</td><td>1,1</td></tr>
<tr><td>Fixed date range</td><td></td><td></td><td>C</td><td>0,1</td></tr>
<tr><td>Date end</td><td>(DATEND)</td><td>ISO 8601:1988</td><td>(S) DA</td><td>0,1</td></tr>
<tr><td>Date start</td><td>(DATSTA)</td><td>ISO 8601:1988</td><td>(S) DA</td><td>0,1</td></tr>
<tr><td>Periodic date range</td><td></td><td></td><td>C</td><td>0,*</td></tr>
<tr><td>Date end</td><td>(PEREND)</td><td>ISO 8601:1988</td><td>(S) DA</td><td>1,1</td></tr>
<tr><td>Date start</td><td>(PERSTA)</td><td>ISO 8601:1988</td><td>(S) DA</td><td>1,1</td></tr>
<tr><td>Status</td><td>(STATUS)</td><td>1 : permanent
2 : occasional
4 : not in use
5 : periodic/intermittent
6 : reserved
7 : temporary
8 : private
9 : mandatory
14 : public</td><td>EN</td><td>0,*</td></tr>
<tr><td>Information</td><td></td><td></td><td>C</td><td>0,*</td></tr>
<tr><td>Language</td><td></td><td>ISO 639-3</td><td>(S) TE</td><td>0,1</td></tr>
<tr><td>Text</td><td>(INFORM)</td><td></td><td>(S) TE</td><td>1,1</td></tr>
<tr><td>Textual description</td><td></td><td></td><td>C</td><td>0,*</td></tr>
<tr><td>File reference</td><td>(TXTDSC)</td><td></td><td>(S) TE</td><td>1,1</td></tr>
<tr><td>Language</td><td></td><td>ISO 639-3</td><td>(S) TE</td><td>0,1</td></tr>
<tr><td>Scale minimum</td><td>(SCAMIN)</td><td>See clause X.X</td><td>IN</td><td>0,1</td></tr>
<tr><td>Recording date</td><td>(RECDAT)</td><td>ISO 8601:1988</td><td>DA</td><td>0,1</td></tr>
<tr><td>Recording indication</td><td>(RECIND)</td><td></td><td>TE</td><td>0,1</td></tr>
</table>

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

<u>INT 1 Reference:</u> M 50, 51

15.23.1 Ferries (see S-4 – B-438)

Ferry routes should be encoded on the largest maximum display scale ENC datasets:
- where they cross fairly narrow channels, in order that through traffic is warned of their existence;
- where the ferry tracks are short enough to be reasonably accurately represented; and
- on ENCs used for harbour navigation, as part of the general information about the area.

If it is required to encode a ferry route, it must be done using the feature **Ferry Route**.

<u>Remarks:</u>
- Long distance ferries which have routes varying with weather, tide and traffic should not generally be encoded, although the terminals should be shown on appropriate maximum display scale ENC datasets, using the feature **Harbour Facility** (see clause X.X), with attribute **category of harbour facility** = *1* (RoRo-terminal) or *3* (ferry terminal).

<u>Distinction:</u>

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).
S-101 Geo Feature: Radar line (RADLNE)
Primitives: Curve

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Orientation			C	1,1
Orientation uncertainty			(S) RE	0,1
Orientation value	(ORIENT)		(S) RE	1,1
Status	(STATUS)	1 : permanent 2 : occasional 3 : recommended 4 : not in use 7 : temporary	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: M 32.1-2
15.24.1 Radar reference lines (see S-4 – B-487.2)
Radar reference lines are mid-channel lines corresponding to lines incorporated in Vessel Traffic Services

(VTS) radar displays. A line is used as a positional reference so that the VTS authorities may easily provide a vessel with its position, relative to the line, when visibility is poor. These must be charted on appropriate maximum display scale ENC data.

If it is required to encode a radar reference line, it must be done using the feature **Radar Line**.

Remarks:
- The value of orientation encoded on the complex attribute **orientation** should be the value of the bearing from seaward. If it is not possible to define a seaward direction, the value that is less than 180° should be used.
- If it is required to encode the area of a VTS containing radar lines, this should be done using the feature **Vessel Traffic Service Area** (see clause X.X). The **Vessel Traffic Service Area** and any associated **Radar Line** features may be aggregated using the collection feature **C_AGGR** (see clause X.X).

Distinction: Radar range; recommended track; Vessel Traffic Service area.

15.25   Radar range

IHO Definition: **RADAR RANGE**. Indicates the coverage of a sea area by a radar surveillance station. Inside this area a vessel may request shore-based radar assistance, particularly in poor visibility. (Adapted from Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

S-101 Geo Feature: Radar range (RADRNG)

Primitives: Surface

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Communication channel	(COMCHA)		TE	0,*
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 7 : temporary	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: M 31

15.25.1 Radar ranges (see S-4 – B-487.1)

Many large ports have a radar surveillance system covering their approaches to provide guidance for vessels, particularly in poor visibility. The maximum range of the system forms an arc or series of overlapping arcs.

If it is required to encode a radar range, it must be done using the feature **Radar Range**.

Remarks:
- Each VHF-channel should be indicated, using the attribute **communication channel** (see clause X.X).

Distinction: Radar line; Vessel Traffic Service area.

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).

S-101 Geo Feature: Radar station (RADSTA)

Primitives: Point

Real World	*Paper Chart Symbol*	*ECDIS Symbol*		

S-101 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Call sign	(CALSGN)		TE	0,1
Category of radar station	(CATRAS)	1 : radar surveillance station 2 : coast radar station	EN	0,*
Communication channel	(COMCHA)		TE	0,*
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Height	(HEIGHT)		RE	0,1
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 7 : temporary 8 : private	EN	0,*
Value of maximum range	(VALMXR)		RE	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1

Comment [A97]: S-57 Extension 06/01.

Comment [A98]: MD8 – 5.Co.3

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

INT 1 Reference: M 30; S 1

15.26.1 Radar station (see S-4 – B-485.1 and B-487.3)

If it is required to encode a radar station, it must be done using the feature **Radar Station**.

Remarks:
- Coast radar stations are shore-based stations which the mariner can contact by radio to obtain a position. These stations are being increasingly replaced by other position-fixing methods.
- The **Radar Station** must only be used to encode the technical equipment itself, independent of the building or structure in which it is installed. If it is required to encode the building or structure (e.g. mast, tower, radar dome) it must be done using an appropriate feature (e.g. **Building**, **Landmark**).
- The attribute **height** is used to encode the height of the emitting part of the radar, where known.
- Each VHF-channel should be indicated, using the attribute **communication channel** (see clause X.X).

Distinction: Radar line; radar range; radar transponder beacon.

16 Areas, limits
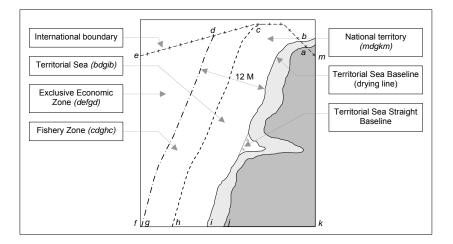
16.1   International boundaries and national limits (see S-4 – B-440)

The United Nations Convention on the Law of the Sea, 1982 came into force on 16 November 1994. UNCLOS contains navigational provisions as well as provisions for determining the limits of various maritime zones. These provisions are binding to all states that have ratified the Convention. For technical aspects of UNCLOS, see IHO publication C-51.

IHO Member States should show, on selected series of their ENCs, their own baseline and maritime limits in accordance with UNCLOS (former IHO Technical Resolution B2.35).
The mariner may be interested in the exact location of international maritime boundaries for two principal reasons:

- When crossing a boundary they could be subject to different laws and regulations which may effect their navigation, e.g. buoyage systems, pilotage regulations, fishing rights, reporting procedures, pollution regulations.
- Where a boundary passes through groups of offshore islands they may wish to know upon which side of the boundary a particular island falls.

16.2   Maritime jurisdiction areas

The clauses in Section 16 below provide guidance for the encoding of maritime jurisdiction areas. Occasionally, these "areas" may actually be defined as linear due to international treaties, or the areas may not be fully defined and it may therefore be necessary to encode the boundary as a linear feature. Clause X.X defining features permitted for use in ENC and their geometric primitives does not allow many of the feature classes relating to maritime jurisdiction areas to be encoded as type curve.

If it is required to encode a linear maritime jurisdiction feature, it must be done using the corresponding feature class as outlined in Section 16 below. If the "curve" primitive is not permitted for the related feature class, the linear maritime jurisdiction feature must be encoded as a "very narrow surface", and by masking all the edges of the area that are not relevant (i.e. are not along the reference line). **Note that this method must not be used where an area can be defined.**

The "very narrow surface" should be a surface having an edge corresponding to the reference line and be about 0.2mm in width at the maximum display scale of the ENC data. Caution notes for such areas must be encoded using the complex attributes **information** and/or **textual description**.

16.2.1   Maritime jurisdiction areas in dispute

In accordance with Article 55 of the United Nations Convention on the Law of the Sea (UNCLOS – 10 December 1982), a Coastal State's Territorial Sea Area and Exclusive Economic Zone must not overlap. Occasionally, small areas at the boundary of two or more Coastal States may be in dispute regarding the establishment of maritime jurisdiction, which may result in a small section of Territorial Sea overlapping an EEZ in the disputed area.

Where issues of maritime jurisdiction between two or more Coastal States are in dispute, the proposed Territorial Sea (**Territorial Sea Area**) of one Coastal State may overlap the proposed EEZ (**Exclusive Economic Zone**) of another Coastal State. In this case, the disputed area should be encoded with overlapping **Territorial Sea Area** and **Exclusive Economic Zone** features, and S-58 (Recommended ENC Validation Checks) test 1700 may be ignored until the dispute is settled. Where an area is in dispute, a **Caution Area** feature should also be encoded covering the entire disputed area, with caution notes advising that the area is in dispute encoded using the complex attributes **information** and/or **textual description**.

16.3   Anchorage area

| IHO Definition: **ANCHORAGE AREA**. An area in which vessels or seaplanes anchor or may anchor. (Adapted from IHO Dictionary – S-32). |

| **S-101 Geo Feature:** Anchorage area (ACHARE) |

| **Primitives:** Point, Surface |

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Category of anchorage	(CATACH)	1 : unrestricted anchorage 2 : deep water anchorage 3 : tanker anchorage 4 : explosives anchorage 5 : quarantine anchorage 6 : seaplane anchorage 7 : small craft anchorage 8 : small craft mooring area 9 : anchorage for periods up to 24 Hours 10 : anchorage for a limited period of time 14 : waiting anchorage	EN	0,*
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Restriction	(RESTRN)	2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 15 : construction prohibited 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development	EN	0,*

Comment [j99]: MD8 – 7.Cl.3 and 7.Co.15.

		prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 23 : cargo transhipment (lightening) prohibited 24 : dragging prohibited 27 : speed restricted 28 : swimming prohibited		
Status	(STATUS)	1 : permanent 2 : occasional 3 : recommended 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 9 : mandatory 14 : public	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
~~Recording date~~	~~(RECDAT)~~	~~ISO 8601:1988~~	~~DA~~	~~0,1~~
~~Recording indication~~	~~(RECIND)~~		~~TE~~	~~0,1~~
~~Source indication~~			~~C~~	~~0,*~~
~~ Authority~~			~~(S) TE~~	~~1,1~~
~~ Nationality~~			~~(S) TE~~	~~1,1~~
~~ ID code~~			~~(S) TE~~	~~0,1~~
~~ Source~~			~~(S) TE~~	~~0,1~~
~~ Source date~~	~~(SORDAT)~~	~~ISO 8601:1988~~	~~(S) DA~~	~~1,1~~

INT 1 Reference: N 10, 12.1-9, 14; Q 44

16.3.1   Anchorages (see S-4 – B-431.1; B-431.3 and B-431.7)

Where the limits of anchorages are defined by a regulatory authority (e.g. harbour authority) they must be shown on the largest maximum display scale ENC data. They may also be shown on other maximum display scale ENC datasets where useful, e.g. for planning purposes.

If it is required to encode an anchorage area, including anchorages for seaplanes, it must be done using the feature **Anchorage Area**.

Remarks:
- The complex attribute **feature name**, sub-attribute **name** is used to encode the name and/or number of the **Anchorage Area**.
- The complex attributes **information** or **textual description** are used to provide additional information about the category of anchorage, where required.
- Individual recommended anchorages without defined limits should be encoded as **Anchorage Area** features of type point, with attributes **category of anchorage** = *1* (unrestricted anchorage) and **status** = *3* (recommended).
- Areas with numerous small craft moorings may be encoded as **Anchorage Area** features of type surface, with **category of anchorage** = *8* (small craft mooring area). For the encoding of mooring buoys, see clause X.X.
- If it is required to encode an anchorage which may be used for a period of not more than 24 hours, it must

be done using **category of anchorage** = *9* (anchorage for periods up to 24 hours).

- If it is required to encode an anchorage with a specific, limited time period, it must be done using **category of anchorage** = *10* (anchorage for limited period of time). The specific limit of time should be encoded using the complex attribute **information** (e.g. *Anchorage limited to 12 hours*).
- Areas where anchoring is prohibited must be encoded, where required, as **Restricted Area** (see clause X.X) with attribute **restriction** = *1* (anchoring prohibited).

Distinction: Anchor berth; mooring/warping facility.

16.4   Anchor berth

IHO Definition: **ANCHOR BERTH**. A designated area of water where a single vessel, seaplane, etc... may anchor. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

S-101 Geo Feature: Anchor berth (ACHBRT)

Primitives: Point, Surface

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of anchorage	(CATACH)	1 : unrestricted anchorage 2 : deep water anchorage 3 : tanker anchorage 4 : explosives anchorage 5 : quarantine anchorage 6 : seaplane anchorage 7 : small craft anchorage 8 : small craft mooring area 9 : anchorage for periods up to 24 Hours 10 : anchorage for a limited period of time	EN	0,*
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Radius	(RADIUS)		RE	0,1
Status	(STATUS)	1 : permanent 2 : occasional 3 : recommended 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 9 : mandatory 14 : public	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1

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

<u>INT 1 Reference:</u> N 11.1, 11.2

16.4.1   Anchor berths (see S-4 – B-431.2)

Where the positions or limits of anchorages, including anchor berths, are defined by a regulatory authority (e.g. harbour authority) they must be shown on the largest maximum display scale ENC data. They may also be shown on other maximum display scale data where useful, e.g. for planning purposes.

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

<u>Remarks:</u>
- The complex attribute **feature name**, sub-attribute **name** is used to encode the name and/or number of the **Anchor Berth**.
- The complex attributes **information** or **textual description** are used to provide additional information about the category of anchorage, where required.
- If an anchor berth is defined by a centre point and a swinging circle, it should be of type point, with the radius of the swinging circle encoded using the attribute **radius**.

<u>Distinction:</u> Anchorage area; berth; mooring/warping facility.

16.5   Seaplane landing area

IHO Definition: **SEAPLANE LANDING AREA**. A designated portion of water for the landing and take-off of seaplanes. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.152, November 2000).

S-101 Geo Feature: Seaplane landing area (SPLARE)

Primitives: Point, Surface

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 7 : entry prohibited 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 14 : area to be avoided 15 : construction prohibited 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transhipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 27 : speed restricted 28 : swimming prohibited	EN	0,*

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

Status	(STATUS)	1 : permanent 2 : occasional 3 : recommended 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 9 : mandatory 14 : public	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
~~Recording date~~	~~(RECDAT)~~	~~ISO 8601:1988~~	~~DA~~	~~0,1~~
~~Recording indication~~	~~(RECIND)~~		~~TE~~	~~0,1~~
~~Source indication~~			~~C~~	~~0,*~~
~~Authority~~			~~(S) TE~~	~~1,1~~
~~Nationality~~			~~(S) TE~~	~~1,1~~
~~ID code~~			~~(S) TE~~	~~0,1~~
~~Source~~			~~(S) TE~~	~~0,1~~
~~Source date~~	~~(SORDAT)~~	~~ISO 8601:1988~~	~~(S) DA~~	~~1,1~~

INT 1 Reference: N 13

16.5.1 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 **Seaplane Landing Area**.

Remarks:
- If it is required to encode an anchorage for seaplanes, it must be done using an **Anchorage Area** feature (see clause X.X), with attribute **category of anchorage =** *6* (seaplane anchorage).

Distinction: Airport area; runway.

16.6   Dumping ground

IHO Definition: **DUMPING GROUND**. A sea area where dredged material or other potentially more harmful material, e.g. explosives, chemical waste, is deliberately deposited. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.59, November 2000).

S-101 Geo Feature: Dumping ground (DMPGRD)

Primitives: Point, Surface

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of dumping ground	(CATDPG)	2 : chemical waste dumping ground 3 : nuclear waste dumping ground 4 : explosives dumping ground 5 : spoil ground 6 : vessel dumping ground	EN	0,*
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 7 : entry prohibited 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 14 : area to be avoided ~~16 : discharging prohibited~~ 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transhipment (lightening) prohibited 24 : dragging prohibited	EN	0,*

		25 : stopping prohibited 27 : speed restricted		
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 6 : reserved 7 : temporary	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
~~Recording date~~	~~(RECDAT)~~	~~ISO 8601:1988~~	~~DA~~	~~0,1~~
~~Recording indication~~	~~(RECIND)~~		~~TE~~	~~0,1~~
~~Source indication~~			~~C~~	~~0,*~~
~~Authority~~			~~(S) TE~~	~~1,1~~
~~Nationality~~			~~(S) TE~~	~~1,1~~
~~ID code~~			~~(S) TE~~	~~0,1~~
~~Source~~			~~(S) TE~~	~~0,1~~
~~Source date~~	~~(SORDAT)~~	~~ISO 8601:1988~~	~~(S) DA~~	~~1,1~~

INT 1 Reference: N 23, 24, 62.1, 62.2

16.6.1   Dumping grounds (see S-4 – B-442; B-446 and B-446.1)

Materials deliberately dumped at sea in specified areas (other than those associated with reclamation works) may be classified, according to their significance to the mariner, as follows:

- Materials which are generally dispersed before reaching the seabed, e.g. sewage sludge, are of little navigational significance and no charting action is usually required.
- Spoil from dredging operations or other works which might reduce charted depths significantly in the designated spoil ground.
- Harmful materials, including explosives and chemicals, which are likely to remain concentrated on the seabed.

Dumping of harmful materials is unlikely to affect depths substantially and such dumping grounds are encoded primarily as a warning against anchoring, trawling or other submarine operations.

If it is required to encode a dumping ground, it must be done using the feature **Dumping Ground**.

Remarks:
- A **Dumping Ground** feature of type surface must be covered by features from Skin of the Earth as appropriate (**Depth Area** or **Unsurveyed Area**).
- Disused dumping grounds for harmful materials are considered dangerous for an indefinite period and must therefore be encoded on the largest maximum display scale ENC datasets, with attribute **status** = *4* (not in use).   The date when the area ceased to be used may be populated using the complex attribute **information**, if known.
- Within a spoil ground; if the depths within the area are liable to be very much less than charted after the discharge of spoil, they may be treated as unsurveyed areas (see clause X.X), in which case soundings and depth contours may be omitted from the area,

16.6.2   Spoil grounds, dredging areas (see S-4 – B-446)

Spoil grounds are areas set aside, clear of shipping channels and in deep water where possible, for the disposal of material (spoil) generally obtained by dredging. Their significance to the mariner is that very large quantities of material may be dumped, decreasing the depth of water available.

Extraction (or dredging) areas are those areas where a concentration of dredging vessels may be encountered, taking up sand or shingle to be brought ashore (e.g. for construction purposes).   Their

significance is primarily as a collision hazard, although they also indicate the likelihood of finding a greater depth of water than charted. Channels dredged to provide an adequate depth of water for navigation are "dredged areas", not to be confused with "dredging areas".

If it is required to encode a spoil ground, it must be done using a **Dumping Ground** feature, with attribute **category of dumping ground** = *5* (spoil ground).

If it is required to encode a dredging area, it must be done using a **Restricted Area** feature (see clause X.X), with attribute **category of restricted area** = *21* (dredging area). An area in which seabed material (e.g. sand, shingle) is being extracted for purposes such as construction must be encoded, where required, using the feature **Offshore Production Area** (see clause X.X), with attribute **category of production area** = *13* (seabed material extraction area).

Distinction: Dredged area; incineration area.

16.7   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).
S-101 Geo Feature: Military practice area (MIPARE)
Primitives: Point, Surface

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Category of military practice area	(CATMPA)	2 : torpedo exercise area 3 : submarine exercise area 4 : firing danger area 5 : mine-laying practice area 6 : small arms firing range	EN	0,*
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Nationality	(NATION)		TE	0,1
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 7 : entry prohibited 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 14 : area to be avoided 15 : construction prohibited 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development	EN	0,*

		restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transhipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 26 : landing prohibited 27 : speed restricted 28 : swimming prohibited		
Status	(STATUS)	1 : permanent 2 : occasional 5 : periodic/intermittent 6 : reserved 7 : temporary 16 : watched 17 : un-watched	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

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

<u>INT 1 Reference:</u> N 30-33

16.7.1   Military practice areas (see S-4 – B-441.1-6)

Military practice (or exercise) areas at sea are of various types and may be classified as follows with regard to their significance for the mariner:
- Firing danger areas, sometimes called firing practice areas, i.e. permanent or temporary ranges, including bombing, torpedo and missile ranges.
- Mine-laying practice (and counter-measures) areas.
- Submarine exercise areas.
- Other exercise areas.

Some degree of restriction on navigation and other rights may be implied by the encoding of military practice areas. There may be varying interpretations of the validity of the restrictions and possible infringement of the rights of innocent passage through territorial waters and elsewhere. Where it is thought desirable to depict such areas, even though clear range procedure may be observed, or the areas appear to be a derogation of the freedom of the seas, mariners should be informed (not necessarily on ENCs) that publication of the details of a law or regulation is solely for the safety and convenience of shipping and implies no recognition of the international validity of the law or regulation. By this means infringements are not condoned but the mariner receives a warning which may be necessary for their safety.

If it is required to encode a military practice area, it must be done using the feature **Military Practice Area**.

<u>Remarks:</u>
- Submarine exercise areas should not be encoded because submarines exercise over wide areas which it

would not be practicable to depict, and over which cautions (to keep a good look out for them) are unlikely to be effective. They may, however, be encoded where they occur in or near major shipping lanes or port approaches.

- Firing danger areas at sea are frequently marked by IALA special buoys sometimes laid around the perimeter of the area and/or by specially erected lights, beacons and targets. If required, all such features which could assist the navigator in identifying their position, or could be a hazard, must be encoded in the normal way,
- The existence of mine laying (and counter-measures/clearance) practice areas implies the possibility of unexploded mines or depth charges on the sea floor, and also the presence of harmless practice mines.

Distinction: Caution area; restricted area; submarine transit lane.

16.8   Administration area (named)

IHO Definition: **ADMINISTRATION AREA**. A defined (and possibly named) administrative area. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.3, November 2000).	

S-101 Geo Feature: Administration area (named) (ADMARE)

Primitives: Surface

Real World	Paper Chart Symbol	ECDIS Symbol

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

INT 1 Reference: N 40, 41

16.8.1 International and national territories (see S-4 – B-440.1 and B-440.3)

International maritime boundaries are those which have been established by agreement between adjacent or opposite States. Boundaries are sometimes negotiated on the basis of the equidistance or "median" line principle. For various reasons, however, agreed boundaries even when negotiated on this principle are seldom true median lines.

Navigationally, international boundaries may vary in their significance over different parts of their lengths.

Inshore, they may represent the delimitation of Territorial Seas of two states or "internal waters", (e.g. within bay closing lines or straight baseline systems). Offshore, they may represent Exclusive Economic Zone and/or Continental Shelf boundaries.

If it is required to encode a named international or national territory, it must be done using the feature **Administration Area (Named)**.

Remarks:
- International land boundaries should be encoded, at least in the vicinity of coasts.

Distinction: Contiguous Zone; Continental Shelf area; Exclusive Economic Zone; fishery zone; land region; Territorial Sea area.

16.9   Cargo transhipment area

<u>IHO Definition:</u> **CARGO TRANSHIPMENT AREA**. An area designated for the transfer of cargo from one vessel to another to reduce the draught of the larger vessel. Also called lightening or cargo transfer area. (IHO Dictionary – S-32).	

<u>**S-101 Geo Feature:**</u> Cargo transhipment area (CTSARE)

<u>**Primitives:**</u> Point, Surface

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Restriction	(RESTRN)	~~1 : anchoring prohibited~~ 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted ~~7 : entry prohibited~~ 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake ~~14 : area to be avoided~~ 15 : construction prohibited 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited ~~23 : cargo transhipment~~	EN	0,*

		(lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 26 : landing prohibited 27 : speed restricted 28 : swimming prohibited		
Status	(STATUS)	1 : permanent 2 : occasional 3 : recommended 5 : periodic/intermittent 6 : reserved 7 : temporary 9 : mandatory	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

Comment [j103]: S-57 Extension 06/01.

INT 1 Reference: N 64

16.9.1 Cargo transhipment areas (see S-4 – B-449.4)

Areas generally outside port limits may be specifically designated as suitable for the transhipment of oil or other materials from large ships to smaller vessels. The areas selected are relatively sheltered locations and lie off main shipping routes. As the purpose of transhipment is usually to reduce the draught of the larger vessel to allow it to proceed to port, the operation is often known as "lightening" and the areas may be known as "lightening areas" or "cargo transfer areas".

If it is required to encode a cargo transhipment area, it must be done using the feature **Cargo Transhipment Area**.

Remarks:
- The encoding of cargo transhipment areas should be adequate to warn other vessels of the likelihood of encountering ships restricted in their ability to manoeuvre. Regulations governing the use of such areas should be encoded using the attribute **restriction** or complex attributes **information** or **textual description**.

Distinction: Dock area; harbour area (administrative); harbour facility.

16.10 Caution area

<table>
<tr><td colspan="6">IHO Definition: CAUTION AREA. Generally, an area where the mariner has to be made aware of circumstances influencing the safety of navigation. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.33, November 2000).</td></tr>
<tr><td colspan="6"><u>S-101 Geo Feature:</u> Caution area (CTNARE)</td></tr>
<tr><td colspan="6"><u>Primitives:</u> Point, Surface</td></tr>
<tr><td colspan="2">Real World</td><td colspan="2">Paper Chart Symbol</td><td colspan="2">ECDIS Symbol</td></tr>
</table>

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Condition	(CONDTN)	1 : under construction 3 : under reclamation 5 : planned construction	EN	0,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Reported date		ISO 8601:1988	DA	0,1
Status	(STATUS)	7 : temporary	EN	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
~~Recording date~~	~~(RECDAT)~~	~~ISO 8601:1988~~	~~DA~~	~~0,1~~
~~Recording indication~~	~~(RECIND)~~		~~TE~~	~~0,1~~
~~Source indication~~			~~C~~	~~0,*~~
~~ Authority~~			~~(S) TE~~	~~1,1~~
~~ Nationality~~			~~(S) TE~~	~~1,1~~
~~ ID code~~			~~(S) TE~~	~~0,1~~
~~ Source~~			~~(S) TE~~	~~0,1~~
~~ Source date~~	~~(SORDAT)~~	~~ISO 8601:1988~~	~~(S) DA~~	~~1,1~~

<u>INT 1 Reference:</u>

16.10.1 Caution areas (see S-4 – B-242)

If it is required to identify an area in which the mariner must be aware of circumstances influencing the safety of navigation (e.g. an area of continually changing depths), and which cannot be encoded using other feature types, it must be done using the feature **Caution Area**. This feature may be required to identify a danger, a

risk, a rule or advice that is not directly related to a particular feature.

Remarks:
- At least one of the complex attributes **information** or **textual description** must be used to encode the relevant cautionary information.
- If the information applies to a specific area the **Caution Area** feature should cover only that area.
- Information which may be of use to the mariner, but is not significant to safe navigation and cannot be encoded using other feature types, should be encoded using an **Nautical Publication Information** feature (see clause X.X), and using the complex attributes **information** and/or **textual description** (see clause X.X). This encoding is intended to reduce the number of alarms or indications generated in the ECDIS due to the overuse of **Caution Area** features.
- Notes should be kept to a minimum and be as concise as is compatible with accuracy and intelligibility. Hydrographic terminology (jargon) should be avoided, giving preference to easily understood words, e.g. "depths" rather than "bathymetry".

16.10.1.1 Collision regulations

Some nations have introduced collision regulations (COLREG's) that may include demarcation lines differentiating between inland water rules and International Rules as a result of the Convention on the International Regulations for Preventing Collisions at Sea 1972. If it is required to encode COLREG's, it should be done using a narrow **Caution Area** feature of type surface covering the demarcation line, with complex attributes **information** and/or **textual description** containing a short explanation about the regulation, (e.g. cautionary note from the paper chart). The complex attribute **textual description** may be used instead of **information**, or for longer explanations or notes.

Distinction: Collision regulations; depth discontinuity; information area; obstruction; underwater rock; unsurveyed area; wreck.

16.11 Contiguous Zone

IHO Definition: **CONTIGUOUS ZONE**. A zone contiguous to a coastal State's Territorial Sea, which may not extend beyond 24 nautical miles from the baselines from which the breadth of the Territorial Sea is measured. The coastal state may exercise certain control in this zone subject to the provisions of International Law. (IHO Dictionary – S-32).

S-101 Geo Feature: **Contiguous zone (CONZNE)**

Primitives: **Surface**

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Nationality	(NATION)		TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Status	(STATUS)	1 : permanent	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: N 44

16.11.1 Contiguous Zones (see S-4 – B-440.6)

The Contiguous Zone is a zone adjacent to the Territorial Sea where the coastal state may exercise the control necessary to prevent or punish infringement of its customs, fiscal, immigration or sanitary laws and regulations within its territory or Territorial Sea. Under UNCLOS, the outer limits of this zone may not extend beyond 24 nautical miles measured from the Territorial Sea Baselines.

If it is required to encode the Contiguous Zone, it must be done using the feature **Contiguous Zone**.

Remarks:
• No remarks.

Distinction: Administrative area; Continental Shelf area; Exclusive Economic Zone; fishery zone; Territorial Sea area.

16.12   Continental Shelf area

<u>IHO Definition:</u> **CONTINENTAL SHELF AREA.** The Continental Shelf of a coastal State comprises the seabed and subsoil of the submarine areas that extend beyond its Territorial Sea throughout the natural prolongation of its land territory to the outer edge of the continental margin, or to a distance of 200 nautical miles from the baselines from which the breadth of the Territorial Sea is measured where the outer edge of the continental margin does not extend out to that distance. (IHO Publication C-51).

<u>S-101 Geo Feature:</u> **Continental shelf area (COSARE)**

<u>Primitives:</u> **Surface**

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

<u>INT 1 Reference:</u> N 46

16.12.1 Continental Shelf (see S-4 – B-440.8)

The delineation of the Continental Shelf beyond 200 nautical miles from the Territorial Sea baselines is complex. Details are given in UNCLOS (see IHO Publication C-51). The coastal State exercises sovereign rights over the Continental Shelf for the purpose of exploring it and exploiting its natural resources. Complex procedures exist within UNCLOS for the establishment of the limits of the Continental Shelf. Where these procedures have been followed the area should be encoded on suitable maximum display scale ENC data.

If it is required to encode the Continental Shelf, it must be done using the feature **Continental Shelf Area**.

Remarks:
- No remarks.

Distinction: Administrative area; Contiguous Zone; Exclusive Economic Zone; fishery zone; Territorial Sea area.

16.13   Custom zone

<table>
<tr><td colspan="5">IHO Definition: CUSTOM AREA. The area within which national custom regulations are in force. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.46, November 2000).</td></tr>
<tr><td colspan="5">S-101 Geo Feature: Custom zone (CUSZNE)</td></tr>
<tr><td colspan="5">Primitives: Surface</td></tr>
<tr><td colspan="2"><i>Real World</i></td><td colspan="1"><i>Paper Chart Symbol</i></td><td colspan="2"><i>ECDIS Symbol</i></td></tr>
<tr><td>S-101 Attribute</td><td>S-57 Acronym</td><td>Allowable Encoding Value</td><td>Type</td><td>Multiplicity</td></tr>
<tr><td>Nationality</td><td>(NATION)</td><td></td><td>TE</td><td>1,1</td></tr>
<tr><td>Information</td><td></td><td></td><td>C</td><td>0,*</td></tr>
<tr><td>   Language</td><td></td><td>ISO 639-3</td><td>(S) TE</td><td>0,1</td></tr>
<tr><td>   Text</td><td>(INFORM)</td><td></td><td>(S) TE</td><td>1,1</td></tr>
<tr><td>Textual description</td><td></td><td></td><td>C</td><td>0,*</td></tr>
<tr><td>   File reference</td><td>(TXTDSC)</td><td></td><td>(S) TE</td><td>1,1</td></tr>
<tr><td>   Language</td><td></td><td>ISO 639-3</td><td>(S) TE</td><td>0,1</td></tr>
<tr><td>Scale minimum</td><td>(SCAMIN)</td><td>See clause X.X</td><td>IN</td><td>0,1</td></tr>
<tr><td>Recording date</td><td>(RECDAT)</td><td>ISO 8601:1988</td><td>DA</td><td>0,1</td></tr>
<tr><td>Recording indication</td><td>(RECIND)</td><td></td><td>TE</td><td>0,1</td></tr>
<tr><td>Source indication</td><td></td><td></td><td>C</td><td>0,*</td></tr>
<tr><td>   Authority</td><td></td><td></td><td>(S) TE</td><td>1,1</td></tr>
<tr><td>   Nationality</td><td></td><td></td><td>(S) TE</td><td>1,1</td></tr>
<tr><td>   ID code</td><td></td><td></td><td>(S) TE</td><td>0,1</td></tr>
<tr><td>   Source</td><td></td><td></td><td>(S) TE</td><td>0,1</td></tr>
<tr><td>   Source date</td><td>(SORDAT)</td><td>ISO 8601:1988</td><td>(S) DA</td><td>1,1</td></tr>
<tr><td colspan="5">INT 1 Reference: N 48

16.13.1 Custom Zones (see S-4 – B-440.2)

If it is required to encode a custom zone, it must be done using the feature Custom Zone.

Custom zones, where details are provided by a regulatory authority, should be encoded on the largest maximum display scale ENC data covering the area.

Remarks:
• No remarks.

Distinction: Check point; free port area.</td></tr>
</table>

16.14 Exclusive Economic Zone

<table>
<tr><td colspan="6">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).</td></tr>
<tr><td colspan="6">S-101 Geo Feature: Exclusive economic zone (EXEZNE)</td></tr>
<tr><td colspan="6">Primitives: Surface</td></tr>
<tr><td colspan="2"><i>Real World</i></td><td colspan="2"><i>Paper Chart Symbol</i></td><td colspan="2"><i>ECDIS Symbol</i></td></tr>
<tr><td>S-101 Attribute</td><td>S-57 Acronym</td><td colspan="2">Allowable Encoding Value</td><td>Type</td><td>Multiplicity</td></tr>
<tr><td>Nationality</td><td>(NATION)</td><td colspan="2"></td><td>TE</td><td>1,1</td></tr>
<tr><td>Information</td><td></td><td colspan="2"></td><td>C</td><td>0,*</td></tr>
<tr><td>   Language</td><td></td><td colspan="2">ISO 639-3</td><td>(S) TE</td><td>0,1</td></tr>
<tr><td>   Text</td><td>(INFORM)</td><td colspan="2"></td><td>(S) TE</td><td>1,1</td></tr>
<tr><td>Textual description</td><td></td><td colspan="2"></td><td>C</td><td>0,*</td></tr>
<tr><td>   File reference</td><td>(TXTDSC)</td><td colspan="2"></td><td>(S) TE</td><td>1,1</td></tr>
<tr><td>   Language</td><td></td><td colspan="2">ISO 639-3</td><td>(S) TE</td><td>0,1</td></tr>
<tr><td>Scale minimum</td><td>(SCAMIN)</td><td colspan="2">See clause X.X</td><td>IN</td><td>0,1</td></tr>
<tr><td><s>Recording date</s></td><td><s>(RECDAT)</s></td><td colspan="2"><s>ISO 8601:1988</s></td><td><s>DA</s></td><td><s>0,1</s></td></tr>
<tr><td><s>Recording indication</s></td><td><s>(RECIND)</s></td><td colspan="2"></td><td><s>TE</s></td><td><s>0,1</s></td></tr>
<tr><td><s>Source indication</s></td><td></td><td colspan="2"></td><td><s>C</s></td><td><s>0,*</s></td></tr>
<tr><td><s>   Authority</s></td><td></td><td colspan="2"></td><td><s>(S) TE</s></td><td><s>1,1</s></td></tr>
<tr><td><s>   Nationality</s></td><td></td><td colspan="2"></td><td><s>(S) TE</s></td><td><s>1,1</s></td></tr>
<tr><td><s>   ID code</s></td><td></td><td colspan="2"></td><td><s>(S) TE</s></td><td><s>0,1</s></td></tr>
<tr><td><s>   Source</s></td><td></td><td colspan="2"></td><td><s>(S) TE</s></td><td><s>0,1</s></td></tr>
<tr><td><s>   Source date</s></td><td><s>(SORDAT)</s></td><td colspan="2"><s>ISO 8601:1988</s></td><td><s>(S) DA</s></td><td><s>1,1</s></td></tr>
<tr><td colspan="6">INT 1 Reference: N 47

16.14.1 Exclusive Economic Zones (see S-4 – B-440.9)

In the Exclusive Economic Zone, the coastal State has sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living, of the waters superjacent to the sea-bed and of the seabed and its subsoil, and with regard to other activities for the economic exploitation and exploration of the Zone, such as the production of energy from the water, currents and winds.

If it is required to encode an Exclusive Economic Zone (EEZ), it must be done using the feature Exclusive Economic Zone.

Remarks:
- For guidance regarding the encoding of areas in which the maritime jurisdiction between two or more Coastal States are in dispute, see clause X.X.

Distinction: Administrative area; Contiguous Zone; Continental Shelf area; fishery zone; Territorial Sea area.</td></tr>
</table>

16.15   Fishery zone

IHO Definition: **FISHERY ZONE**. The offshore zone in which exclusive fishing rights and management are held by the coastal nation. (IHO Dictionary – S-32).

S-101 Geo Feature: Fishery zone (FSHZNE)

Primitives: Surface

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Nationality	(NATION)		TE	1,1
Status	(STATUS)	1 : permanent 5 : periodic/intermittent 6 : reserved 7 : temporary	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: N 45

16.15.1 Fishery zones (see S-4 – B-440.7)

A fishery zone is an area inside and beyond the Territorial Sea where a coastal State proclaims that it alone may regulate fishing. Where States have permitted others to fish in parts of the area, it may be desirable to encode the area of both the full area and the area of special concessionary rights. In some instances, claims are described as "conservation zones"; for practical purposes these may be classed with fishery zones since

their intended function is to institute fishery conservation measures. Most of the fishery zone claims are limited by fixed distance (200 nautical miles in some cases) from the Territorial Sea baselines.

If it is required to encode a fishery zone, it must be done using the feature **Fishery Zone**.

Remarks:
- Fishery zones commonly coincide with other national jurisdiction areas such as Continental Shelf and Exclusive Economic Zone. Where this occurs, Producing Authorities may choose to omit the **Fishery Zone** from the area covered by these other national jurisdiction areas, as the fact that fishing regulations apply in these areas is implicit.

Distinction: Administrative area; Contiguous Zone; Continental Shelf area; Exclusive Economic Zone; fishing ground; restricted area; Territorial Sea area.

16.16   Fishing ground

IHO Definition: **FISHING GROUND**. A water area in which fishing is frequently carried on. (IHO Dictionary – S-32).				
S-101 Geo Feature: Fishing ground (FSHGRD)				
Primitives: Surface				

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted ~~3 : fishing prohibited~~ 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted ~~7 : entry prohibited~~ 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted ~~13 : no wake~~ ~~14 : area to be avoided~~ 15 : construction prohibited 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transhipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 26 : landing prohibited 27 : speed restricted 28 : swimming prohibited	EN	0,*

Comment [A104]: S-57 Extension 06/01.

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

Status	(STATUS)	1 : permanent 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 14 : public 16 : watched 17 : un-watched 19 : buoyed	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

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

INT 1 Reference:

16.16.1 Fishing grounds

If it is required to encode a fishing ground, it must be done using the feature **Fishing Ground**.

Remarks:
• No remarks.

Distinction: Fishery zone; marine farm/culture.

16.17 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).
S-101 Geo Feature: Free port area (FRPARE)
Primitives: Surface

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Status	(STATUS)	1 : permanent 6 : reserved 8 : private 14 : public	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference:

16.17.1 Free port areas

If it is required to encode a free port area, it must be done using the feature **Free Port Area**.

Remarks:
- No remarks.

Distinction: Custom zone; production/storage area.

16.18 Harbour area (administrative)

IHO Definition: **HARBOUR AREA**. The area over which a harbour authority has jurisdiction. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.80, November 2000).	

S-101 Geo Feature: Harbour area (administrative) (HRBARE)

Primitives: Surface

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Status	(STATUS)	1 : permanent 4 : not in use 6 : reserved 8 : private 14 : public 16 : watched 17 : un-watched	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
~~Recording date~~	~~(RECDAT)~~	~~ISO 8601:1988~~	~~DA~~	~~0,1~~
~~Recording indication~~	~~(RECIND)~~		~~TE~~	~~0,1~~
~~Source indication~~			~~C~~	~~0,*~~
~~Authority~~			~~(S) TE~~	~~1,1~~
~~Nationality~~			~~(S) TE~~	~~1,1~~
~~ID code~~			~~(S) TE~~	~~0,1~~
~~Source~~			~~(S) TE~~	~~0,1~~
~~Source date~~	~~(SORDAT)~~	~~ISO 8601:1988~~	~~(S) DA~~	~~1,1~~

INT 1 Reference: N 49

16.18.1 Administrative harbour areas (see S-4 – B-430.1)

Administrative harbour areas must be shown on at least the largest maximum display scale ENC datasets, where possible, to assist mariners in complying with harbour regulations.

If it is required to encode an administrative harbour area, it must be done using the feature **Harbour Area**.

Remarks:
- If it is required to encode a named harbour area over which there is no jurisdictional authority, it must be done using the feature **Sea Area/Named Water Area** (see clause X.X).
- A masked line may be used to suppress the symbolisation of the boundary, where such symbolisation is considered inappropriate.

Distinction: Dock area; sea area/named water area.

16.19 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).			

S-101 Geo Feature: Incineration area (ICNARE)

Primitives: Point, Surface

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 7 : entry prohibited 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 14 : area to be avoided 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transhipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 27 : speed restricted 28 : swimming prohibited	EN	0,*
Status	(STATUS)	1 : permanent 2 : occasional	E	0,*

Comment [j107]: S-57 Extension 06/01.

		5 : periodic/intermittent 6 : reserved 7 : temporary 16 : watched 17 : un-watched		
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
~~Recording date~~	~~(RECDAT)~~	~~ISO 8601:1988~~	~~DA~~	~~0,1~~
~~Recording indication~~	~~(RECIND)~~		~~TE~~	~~0,1~~
~~Source indication~~			~~C~~	~~0,*~~
~~Authority~~			~~(S) TE~~	~~1,1~~
~~Nationality~~			~~(S) TE~~	~~1,1~~
~~ID code~~			~~(S) TE~~	~~0,1~~
~~Source~~			~~(S) TE~~	~~0,1~~
~~Source date~~	~~(SORDAT)~~	~~ISO 8601:1988~~	~~(S) DA~~	~~1,1~~

INT 1 Reference: N 65

16.19.1 Incineration areas (see S-4 – B-449.3)

If it is required to encode an incineration area, it must be done using the feature **Incineration Area**.

Remarks:
- No remarks.

Distinction: Custom ground.

16.20   Log pond

IHO Definition: **LOG POND**. A maritime area enclosed with connected floating timbers used as a staging area for sawn logs. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.102, November 2000).

S-101 Geo Feature: Log pond (LOGPON)

Primitives: Point, Surface

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Status	(STATUS)	1 : permanent 2 : occasional 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: N 61

16.20.1 Log ponds (see S-4 – B-449.2)

If it is required to encode a log pond (also known as booming ground), it must be done using the feature **Log Pond**.

Remarks:

- It is not required to separately encode any posts, piles or other log pond barrier supports.

Distinction:

16.21   Oil barrier

<u>IHO Definition:</u> **OIL BARRIER**. A floating barrier to stop and contain the spread of oil on a water body surface. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

S-101 Geo Feature: Oil barrier (OILBAR)

Primitives: Curve

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of oil barrier	(CATOLB)	1 : oil retention (high pressure pipe) 2 : floating oil barrier	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
~~Recording date~~	~~(RECDAT)~~	~~ISO 8601:1988~~	~~DA~~	~~0,1~~
~~Recording indication~~	~~(RECIND)~~		~~TE~~	~~0,1~~
~~Source indication~~			~~C~~	~~0,*~~
~~Authority~~			~~(S) TE~~	~~1,1~~
~~Nationality~~			~~(S) TE~~	~~1,1~~
~~ID code~~			~~(S) TE~~	~~0,1~~

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

INT 1 Reference: F 29

16.21.1 Oil barriers (see S-4 – B-449.2)

If it is required to encode an oil barrier, it must be done using the feature **Oil Barrier**.

Remarks:
• No remarks.

Distinction:

16.22 Straight Territorial Sea Baseline

IHO Definition: **STRAIGHT TERRITORIAL SEA BASELINE**. A baseline is the line from which the outer limits of the Territorial Sea and certain other outer limits are measured. (IHO Dictionary – S-32).

Straight baselines are a system of straight lines joining specified or discrete points on the low-water line, usually known as straight baseline turning points. (IHO Dictionary – S-32).

S-101 Geo Feature: Straight territorial sea baseline (STSLNE)

Primitives: Curve

Real World	Paper Chart Symbol	ECDIS Symbol

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

INT 1 Reference: N 42

16.22.1 Straight Territorial Sea Baselines (see S-4 – B-440.4)

A Territorial Sea is delimited by:
- Territorial Sea Baselines (drying lines);
- Straight Territorial Sea Baselines;
- International maritime boundaries (see clause X.X); and
- Seaward limits of Territorial Seas (see clause X.X).

The term "Baseline" refers to the line from which the breadth of the Territorial Sea, the outer limits of the Contiguous Zone, the Exclusive Economic Zone and, in some cases, the Continental Shelf are measured. It is also the dividing line between internal waters and territorial seas. Internal waters comprise all areas of the sea on the landward side of the Territorial Sea Baselines, as well as inland waters including rivers, lakes, etc.

The normal baseline is the low water line (which is not defined any more precisely by UNCLOS) of the mainland, islands, or low tide elevations, as depicted on large scale charts officially recognised by the coastal State; they therefore do not require depiction in ENCs. Features which are naturally-formed and dry at low water (e.g. rocks, reefs, sand banks) may be considered low-tide elevations and included in the baseline (details are given in UNCLOS - see IHO publication C-51).

A straight baseline may be used:

- as a closing line across the mouth or estuary of a river;
- as a closing line across the mouth of a juridical bay or a historical bay;
- as part of a system of Straight Territorial Sea Baselines, e.g. to connect seaward points on a deeply indented coastline, a coastline that is fringed with islands, around unstable coastlines; or
- as an archipelagic baseline.

If it is required to encode a Straight Territorial Sea Baseline, it must be done using the feature **Straight Territorial Sea Baseline**.

Remarks:
- No remarks.

Distinction:

16.23   Territorial Sea area

IHO Definition: **TERRITORIAL SEA AREA**. A belt of water of a defined breadth but not exceeding 12 nautical miles measured seaward from the Territorial Sea Baseline. (IHO Dictionary – S-32).
S-101 Geo Feature: Territorial sea area (TESARE)
Primitives: Surface

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Nationality	(NATION)		TE	1,1
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 7 : entry prohibited 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 14 : area to be avoided 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transhipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 26 : landing prohibited 27 : speed restricted	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1

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

INT 1 Reference: N 43

16.23.1 Territorial Seas (see S-4 – B-440.5)

A Territorial Sea is delimited by:
- Territorial Sea Baselines (drying lines);
- Straight Territorial Sea Baselines (see clause X.X);
- International maritime boundaries (see clause X.X); and
- Seaward limits of Territorial Seas.

Within the Territorial Sea, a coastal State exercises sovereignty subject to rules of international law, including the right of innocent passage for foreign ships.

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

Remarks:
- For guidance regarding the encoding of areas in which the maritime jurisdiction between two or more Coastal States are in dispute, see clause X.X.

Distinction: Administrative area; Contiguous Zone; Continental Shelf area; Exclusive Economic Zone; fishery zone; restricted area.

16.24 Submarine transit lane

<table>
<tr><td colspan="6">IHO Definition: SUBMARINE TRANSIT LANE. An area where submarines may navigate under water or at the surface. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.168, November 2000).</td></tr>
<tr><td colspan="6">S-101 Geo Feature: Submarine transit lane (SUBTLN)</td></tr>
<tr><td colspan="6">Primitives: Surface</td></tr>
<tr><td colspan="2">Real World</td><td colspan="2">Paper Chart Symbol</td><td colspan="2">ECDIS Symbol</td></tr>
</table>

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Nationality	(NATION)		TE	0,1
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 7 : entry prohibited 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 14 : area to be avoided 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transhipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 27 : speed restricted	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*

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

INT 1 Reference: N 33

16.24.1 Submarine transit lanes (see S-4 – B-441.5)

Submarine transit lanes should not generally be encoded because submarines exercise over wide areas which it would not be practicable to depict, and over which cautions (to keep a good look out for them) are unlikely to be effective. They may, however, be encoded where they occur in or near major shipping lanes or port approaches.

If it is required to encode a submarine transit lane, it must be done using the feature **Submarine Transit Lane**.

Remarks:
- No remarks.

Distinction: Military practice area.

16.25   Restricted area

IHO Definition: **RESTRICTED AREA**. A specified area on land or water designated by an appropriate authority within which access or navigation is restricted in accordance with certain specified conditions. (Adapted from IHO Dictionary – S-32).

S-101 Geo Feature: Restricted area (RESARE)

Primitives: Surface

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of restricted area	(CATREA)	1 : offshore safety zone 4 : nature reserve 5 : bird sanctuary 6 : game reserve 7 : seal sanctuary 8 : degaussing range 9 : military area 10 : historic wreck area 12 : navigational aid safety zone 14 : minefield 18 : swimming area 19 : waiting area 20 : research area 21 : dredging area 22 : fish sanctuary 23 : ecological reserve 24 : no wake area 25 : swinging area 26 : recreation area 27 : environmentally sensitive sea area 28 : particularly sensitive sea area 29 : disengagement area 30 : port security area	EN	0,*
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted	EN	0,*

		3 : fishing prohibited
		4 : fishing restricted
		5 : trawling prohibited
		6 : trawling restricted
		7 : entry prohibited
		8 : entry restricted
		9 : dredging prohibited
		10 : dredging restricted
		11 : diving prohibited
		12 : diving restricted
		13 : no wake
		14 : area to be avoided
		15 : construction prohibited
		16 : discharging prohibited
		17 : discharging restricted
		18 : industrial or mineral
		    exploration/development
		    prohibited
		19 : industrial or mineral
		    exploration/development
		    restricted
		20 : drilling prohibited
		21 : drilling restricted
		22 : removal of historical
		    artefacts prohibited
		23 : cargo transhipment
		    (lightening) prohibited
		24 : dragging prohibited
		25 : stopping prohibited
		26 : landing prohibited
		27 : speed restricted
		28 : swimming prohibited		

Status	(STATUS)	1 : permanent 2 : occasional 3 : recommended 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 9 : mandatory 18 : existence doubtful 19 : buoyed	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

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

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

16.25.1 Restricted areas in general (see S-4 – B-431.4; B-435.7; B-435.11; B-437.1-7; B-439.2-4; B-445.9; B-448; B-448.1 and B-449.5)

There are many types of areas within which certain activities are discouraged or prohibited, or from which certain classes of vessels are excluded. The general term for all areas in which certain aspects of navigation may be restricted or prohibited by regulations is "Restricted Area", or equivalent. The word "prohibited", or its equivalent, may appear in terms relating to activities which are contrary to the regulations, e.g. "Anchoring Prohibited", "Entry Prohibited".

If it is required to encode a restricted area, it must be done using the feature **Restricted Area**, or using other features having the attribute **restriction** (**Anchorage Area**, **Cable Area**, **Dumping Ground**, **Dredged Area**, **Deep Water Route Part**, **Fairway**, **Fishing Ground**, **Harbour Facility**, **Incineration Area**, **Inshore Traffic Zone**, **Marine Farm/Culture**, **Military Practice Area**, **Offshore Production Area**, **Submarine Pipeline Area**, **Pipeline Submarine/On Land**, **Precautionary Area**, **Seaplane Landing Area**, **Submarine Transit Lane**, **Territorial Sea Area**, **Traffic Separation Scheme Crossing**, **Traffic Separation Scheme Lane Part**, **Traffic Separation Scheme Roundabout**).

Remarks:
- The attribute **category of restricted area** is used to describe the reason for the regulation, while the attribute **restriction** describes the restrictions.
- The complex attributes **information** or **textual description** are used to provide an additional explanation about the regulation (e.g. caution note from a paper chart), where required.
- The term "no anchoring area" is used to identify the IMO routeing measure of that name. Such areas, where required, must be encoded as **Restricted Area** with attribute **restriction** = *1* (anchoring prohibited).
- An area in which regulations apply due to recreation activities such as water skiing, jet skiing, kite surfing and rowing must be encoded, where required, as **Restricted Area** with **category of restriction** = *26* (recreation area).
- If it is required to encode an area for which the mariner must be made aware of circumstances influencing the safety of navigation, it must be done using the feature **Caution Area** (see clause X.X). This feature may be used to identify a danger, a risk, a rule or advice (e.g. an area of continually changing depths) which is not directly related to a particular feature.

16.25.1.1 Minefields (see S-4 – B-441.8)

If it is required to encode a minefield, it must be done using a **Restricted Area** feature, with attribute **category of restricted area** = *14* (minefield). Former mined areas should also be encoded with attribute **status** = *4* (not in use).

16.25.1.2 Degaussing ranges (see S-4 – B-448)

A degaussing (or demagnetising) range is an area, usually of about 0.2M diameter, within which ships' magnetic fields may be measured. Sensing instruments and cables are installed on the sea floor in the range and there are cables leading from the range to a control position ashore. The range is usually marked by distinctive buoys. The significance of a degaussing range to mariners is that anchoring and trawling are prohibited and that the range may have to be avoided when vessels are using it.

If it is required to encode a degaussing range, it must be done using a **Restricted Area** feature, with attribute **category of restricted area** = *8* (degaussing range).

16.25.1.3 Nature reserves (see S-4 – B-437.3)

If it is required to encode a marine nature reserve area, it must be done using a **Restricted Area** feature, with attribute **category of restricted area** = *4* (nature reserve).

16.25.1.4 Speed limits (see S-4 – B-430.2)

Speed is often limited inside harbours in order to prevent wakes. If it is required to encode this restriction, it must be done using a **Restricted Area** feature, with the attribute **category of restricted area** = *24* (no wake area) or **restriction** = *13* (no wake). If it is required to encode cases where the speed limit is known, it must be done using **restriction** = *27* (speed restricted), with the speed limit and its unit of measurement encoded using the complex attribute **information** (e.g. *Speed limit is 5 knots*).

If it is required to encode the buoys/beacons marking the **Restricted Area** feature with speed limits, it must be done using **Beacon Special Purpose/General** or **Buoy Special Purpose/General** features (see clauses X.X, X.X), with the attribute **category of special purpose mark** = *24* ("reduced wake" mark) or *25* (speed limit mark). The speed limit and its unit of measurement should be encoded using the complex attribute **information** (e.g. *Speed limit is 6 knots*).

16.25.1.5 Anchoring restricted (see S-4 – B-431.4)

If it is required to encode a restricted anchoring area, it must be done using a **Restricted Area** feature, or using other features with the attribute **restriction** (see clause X.X), where **restriction** = *1* (anchoring prohibited), *2* (anchoring restricted) or *7* (entry prohibited). Additional information about the restriction should be encoded using the complex attribute **information** or **textual description**.

16.25.1.6 Areas to be avoided (see S-4 – B-435.7)

If it is required to encode an IMO designated Area to be Avoided, it must be done using a **Restricted Area** feature, with attribute **restriction** = *14* (area to be avoided). An area to be avoided around a navigational aid must also be encoded with attribute **category of restricted area** = *12* (navigational aid safety zone).

16.25.1.7 Environmentally Sensitive Sea Areas (see S-4 – B-437)

Environmentally Sensitive Sea Areas (ESSA) should be included on ENCs where there is a specifically identified requirement, and where it is practicable, given the maximum display scale of the ENC data and the extent of the ESSA. If there is no such requirement, or if it is not practicable, details of ESSA should only be inserted in associated publications, such as Sailing Directions. It should be noted that the inclusion of ESSA on smaller maximum display scale of the ENC data may be appropriate for voyage planning purposes.

If it is required to encode an Environmentally Sensitive Sea Area, it must be done using a **Restricted Area** feature, with attribute **category of restricted area** = *27* (ESSA) or *28* (PSSA).

An Environmentally Sensitive Sea Area that is shown on the source as a point symbol should be encoded using a small surface **Restricted Area** feature.

Distinction: Anchorage area; cable area; caution area; collision regulations; Deep Water route part; depth area; dredged area; dumping ground; fairway; information area; military practice area; pipeline area; swept area.

16.26 Pilotage district

IHO Definition: **PILOTAGE DISTRICT**. An area within which pilotage regulations apply. Definition?				
S-101 Geo Feature: Pilotage district				
Primitives: Surface				

Real World	Paper Chart Symbol	ECDIS Symbol

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

INT 1 Reference:

16.26.1 Pilotage districts (see S-4 – B-XXX)

If it is required to encode the area within which regulations regarding pilotage apply it should be done using the feature **Pilotage District**.

Remarks:

- At least one of the complex attributes **information** or **textual description** must be populated for **Pilotage District** features.
- The relationship between the pilotage district and any associated pilot boarding places (see clause X.X) should be encoded using an association feature (see clause X.X).
- Where the limit of pilotage regulations are coincident with harbour or port limits it is not required to encode a **Pilotage District** feature.

Distinction: Pilot boarding place

Comment [r114]: Association to Pilot boarding places?

Comment [r115]: Could add contact details complex attribute to carry comcha etc

17   Aids to Navigation - Overview

17.1   Geo features forming parts of navigational aids

Aids to navigation are composed of fixed or floating structure features carrying equipment features.

The most common structure features are: **Beacon Cardinal**, **Beacon Isolated Danger**, **Beacon Lateral**, **Beacon Safe Water**, **Beacon Special Purpose/General**, **Buoy Cardinal**, **Buoy Installation**, **Buoy Isolated Danger**, **Buoy Lateral**, **Buoy Safe Water**, **Buoy Special Purpose/General**, **Bridge**, **Building**, **Crane**, **Daymark**, **Floating Dock**, **Fortified Structure**, **Fishing Facility**, **Hulk**, **Light Float**, **Light Vessel**, **Landmark**, **Mooring/Warping Facility**, **Offshore Platform**, **Pile**, **Pontoon**, **Pylon/Bridge Support**, **Obstruction**, **Shoreline Construction**, **Wreck**.

Equipment features consist of: **Daymark**, **Fog Signal**, **Light**, **Radar Station**, **Radio Station**, **Retroreflector**, **Radar Transponder Beacon**, **Signal Station Traffic**, **Signal Station Warning**, ~~**Topmark**~~.
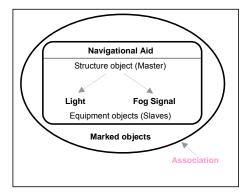
Where the source indicates the existence of a navigation aid equipment feature, but there is no indication as to the type or shape of the structure feature, a **Beacon Special Purpose** feature, with the attribute **beacon shape** populated with an empty (null) value, must be encoded as the master feature (see clause X.X).

Radar reflectors must not be encoded as separate features when attached to navigational aids. If it is required to encode their existence, it must be done using the attribute **radar conspicuous**.

Rescue stations and coast guard stations are not related to navigation, and they must not, therefore, be part of the equipment features of navigational aids. If it is required to encode a rescue or coast guard station at the same location as a navigational mark, it must be encoded as a separate feature, and share the same spatial type as the navigational aid.
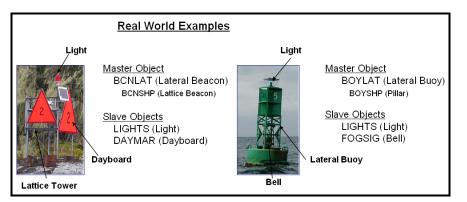
17.2   Relationships

A master to slave relationship must be created in order to relate the different features comprising a navigational aid. Where a master to slave relationship is created, there must be only one master (structure) feature related to one or more slave (equipment) features. A slave feature must not be related to more than one master feature, and a feature must not be both a master and a slave feature.

Navigational Aids – Master / Slave Relationship

When the navigational aid contains a structure feature (from the list at clause 17.1), this feature must be the master feature, and the equipment features must be the slaves. Note that **Daymark** may be a master feature or a slave feature; where a navigational aid contains a **Daymark** and there is no other base structure (which can serve as the master feature) indicated on the source, the **Daymark** feature should be encoded as the master feature.

When the nature of the base structure on land is unknown or there is no structure feature, one of the equipment features may be chosen as the master feature, giving priority to a **Light** feature, if one exists. Alternatively, a **Pile** feature of type point or a **Beacon Special Purpose/General** feature may be encoded as the structure feature at the same position as the equipment features. When the nature of the base structure in the water is unknown, an ECDIS Base Display feature (see S-52, Annex A, clause 13.2), e.g. **Pile** feature of type point or a **Beacon Special Purpose/General** feature, must be encoded as the structure feature at the same position as the equipment features.

Navigational Aids – Master / Slave Relationship: Real World Examples

In the above real world examples, the master and slave features that make up the navigational aids are point spatial types, and they must share the same geographic point spatial type.

If it is required to encode the name of the navigational aid, it must be done using the complex attribute **feature name** on the master feature. The name must not be repeated for the slave features. If the name is painted on the structure, it must be encoded with the same spelling in the complex attribute **feature name** (sub-attribute **name**, no value populated for sub-attribute **language**) if it is based on the Latin alphabet. If the name is not based on the Latin alphabet, it must be encoded using **feature name** (**name**), with an appropriate value populated for the sub-attribute **language**, and transliterated for encoding on an iteration of **feature name** (**name**) with no value populated for **language**.

All point features comprising a navigational aid must share the same geographic point spatial instance.

The navigational aid may be associated with the features which it marks (e.g. to **Restricted Area** or **Obstruction** features) using the collection feature **C_ASSO** (see clause XX). Several navigational aids and several marked features may be associated in the same relationship.

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

Systems of buoyage are described as lateral, cardinal, or a combination of lateral and cardinal. Lateral systems depend on a direction of buoyage being defined. The cardinal system depends solely on the main points of the compass. Special purpose buoys often mark the limits or centre of an area (e.g. an exercise area, a dumping ground) and do not necessarily have lateral or cardinal system characteristics.
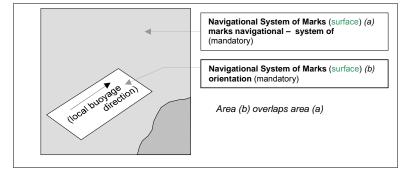
The IALA Maritime Buoyage System details, including the extent of Regions A and B, are given in other publications (e.g. UK's booklet NP 735 "IALA Maritime Buoyage System"). Although it is called a buoyage system, it applies to all fixed and floating marks except lighthouses, some sector lights, leading lights and marks, major floating lights and lights on offshore structures. Five types of marks are provided by the system: Lateral, Cardinal, Isolated danger, Safe water and Special marks, which may be used in any combination. Emergency Wreck Marking Buoys were added on a trial basis in 2006.

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

The buoyage system of the dataset and, where necessary, the direction of buoyage, must be encoded using the meta feature **Navigational System of Marks**:

All parts of the dataset containing data must be covered by **Navigational System of Marks** features, with the attribute **marks navigational – system of** indicating the buoyage system in operation. **Navigational System of Marks** features with a value encoded for **marks navigational – system of** must not overlap.

Within a dataset, there may be some areas where the direction of buoyage is defined by local rules and must, therefore, be specified. These areas should be encoded as separate **Navigational System of Marks** surface features, with the complex attribute **orientation** indicating the direction of buoyage (**marks navigational – system of** must not be encoded for these features). **Navigational System of Marks** features with a value encoded for **orientation** (orientation value) must not overlap, but in areas where local buoyage directions apply, **Navigational System of Marks** with a value encoded for **orientation** (orientation value) may overlap **Navigational System of Marks** with a value encoded for **marks navigational – system of** (see Figure below).

Buoyage system and direction

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

Remarks:

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

17.3.1.1 Encoding IALA marks within IALA A or B

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

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

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

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

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

18 Lights

For the purpose of encoding lights in ENC, the following features must be used, depending on the type of light:
- **All Around/Single Sectored Light** (see clause X.X) for non-directional lights with a single sector (which includes lights having a 360° sector (all-around lights));
- **Sectored Light** (see clause X.X) for lights having two or more sectors which have different characteristics;
- **Directional Light** (see clause X.X) for single narrow sectored lights having a directional function;
- **Fog Detector Light** (see clause X.X) for lights used to automatically determine conditions of visibility which warrant the turning on or off of a sound signal; and
- **Air Obstruction Light** (see clause X.X) for lights marking an obstacle which constitutes a danger to air navigation.

When encoding a light, the combination of the character and purpose of the light must be evaluated in order to determine the most appropriate light feature from the above list.

18.1 Lights: General

18.1.1 Rhythms of lights (see S-4 – B-471.2)

The principal character of a light is its rhythm (although, strictly, fixed lights and some alternating lights are not "rhythmic").

If it is required to encode the rhythms of lights, this must be done using the complex attribute **rhythm of light**, sub-attributes **light characteristic** and **signal group**. When populating **rhythm of light**, the sub-attributes **signal group**, **signal period** and **signal sequence** are only valid for non-fixed lights (i.e. sub-attribute **light characteristic** ≠ *1* (fixed)), with **signal group** and **signal period** being mandatory.

The use of these sub-attributes is defined in the following table; it contains the most common examples of coding; other coding combinations are possible:

Rhythms of lights	F	Oc	Oc(2)	Oc(2+3)	Iso	Fl	Fl(3)	LFl
light characteristic	*1*	*8*	*8*	*8*	*7*	*2*	*2*	*3*
signal group	*prohibited*	*(1)*	*(2)*	*(2+3)*	*(1)*	*(1)*	*(3)*	*(1)*

Rhythms of lights	Q	Q(3)	IQ	VQ	VQ(3)	IVQ	UQ	IUQ
light characteristic	*4*	*4*	*9*	*5*	*5*	*10*	*6*	*11*
signal group	*(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
light characteristic	*12*	*13*	*25*	*26*	*28*	*19*	*19*	*17*
signal group	*(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 light features, in this case two **Light All Around/Single Sectored** features, one with complex attribute **rhythm of light**, sub-attribute **light characteristic** = *1* (fixed) and the other with **light characteristic** = *2* (flashing), and not as one **Light All Around/Single Sectored** with **light characteristic** = *13* (fixed/flash).

18.1.2 Elevations of lights (see S-4 – B-471.6)

The elevation of a light is the vertical distance between the light source and the plane of reference for heights for the ENC data (see clause X.X).

If it is required to encode the elevation of a light on a fixed structure, it must be done using the attribute **height**.

If it is required to encode the height above the water surface of a light on a floating structure, it must be done using the complex attribute **information** on the relevant light feature.

18.1.3 Colours of lights (see S-4 – B-471.6)

18.1.4 Times of exhibition and exhibition conditions (see S-4 – B-473)

18.1.4.1 Night lights

If it is required to encode a night light, it must be done using the attribute **exhibition condition of light** = *4* (night light) on the light feature.

Unwatched lights (see S-4 – B-473.1)

This information should not be encoded, but unwatched (unmanned) lights, with no standby or emergency arrangements, may be encoded using attribute **status** = *17* (unwatched).

18.1.4.2 Occasional lights (see S-4 – B-473.2)

If it is required to encode an occasional light, it must be done using attribute **status** = *2* (occasional). If it is required to encode a private light that is not regularly exhibited, it must be done using **status** = *2,8* (occasional, private).

18.1.4.3 Daytime lights (see S-4 – B-473.4)

If it is required to encode a daytime light, it must be done using attribute **exhibition condition of light** = *1* (light shown without change of character).

If it is required to encode a light having characteristics shown by day different to those shown at night, it must be done by encoding two light features sharing the same point spatial type:
- one light feature with **exhibition condition of light** = *2* (daytime light),
- one light feature with **exhibition condition of light** = *4* (night light).

18.1.4.4 Fog lights (see S-4 – B-473.5)

If it is required to encode a light which is exhibited in fog or conditions of reduced visibility, it must be done using a light feature, with attributes **exhibition condition of light** = *3* (fog light) and **status** = *2* (occasional).

If it is required to encode a light having characteristics shown in fog that are different to those shown in conditions of normal visibility, it must be done by encoding two light features sharing the same point spatial instance:
- one light feature with **exhibition condition of light** = *3* (fog light) and **status** = *2* (occasional)
- one light feature with **exhibition condition of light** = *2* (daytime light) or *4* (night light) and complex attribute **information** (sub-attribute **text**) = *Character of the light changes in fog*.

Note the distinction between fog lights and fog detector lights, which are lights used to automatically determine conditions of visibility which warrant the turning on or off of a sound signal. Fog detector lights must be encoded, where required, using the feature **Light Fog Detector** (see clause X.X).

18.1.5 Leading lights (see S-4 – B-475.6)

If it is required to encode a leading light, it must be done using a **Light All Around/Single Sectored** feature, with attribute:

category of light	=	*4,12* - front leading light
		4,13 - rear leading light
		4,14 - lower leading light
		4,15 - upper leading light

Remarks:
- The complex attribute **orientation** must not be used for leading lights, except for directional lights.
- Even if, on the source, the leading lights are merged into a single symbol, a **Light All Around/Single Sectored** feature must be created for each light. These lights must be placed in their true position, i.e. where the source (e.g. paper chart) shows a single light with a legend such as *2F.Bu*, further investigation must be done in order to determine the true position of each light, and its full attribution. Compilers should note that where this occurs on paper charts, the position of the light shown on the chart normally corresponds with the rear leading light.
- The leading line must be encoded using the method described in clause X.X.

18.1.6 Lighthouses (see S-4 – B-457.3)

If it is required to encode a lighthouse, it must be done using a **Landmark** feature (see clause X.X), with attributes **category of landmark** = *17* (tower) and **function** = *33* (light support) for towers, or using a **Building** feature (see clause X.X), with the attribute **function** = *33*, for any other shapes.

If it is required to encode the attributes **elevation**, **height** and **vertical length** for a lighthouse, this must be done as described in clause X.X.

If the lighthouse is permanently extinguished/unlit, this must be indicated by population of the attribute **status** = *4* (not in use) for the **Landmark**/**Building**, and the light feature must be removed. Where a lighthouse is illuminated

by floodlights, the additional value of **status** = *12* (illuminated) must also be populated. For lights that are temporarily extinguished, see clause X.X.

18.1.7 Various special types of lights

Type	S-4	category of light	Remarks
Subsidiary light	B-471.8	10	
Aero light	B-476.1	5	
Air obstruction light	B-476.2	6	
Fog detector light	B-477		Encode using feature **Light Fog Detector**
Bearing light		18	
Flood light	B-478.2	8	Only to encode flood lights that are visible from seaward. The illuminated structure should be encoded using appropriate feature classes, with attribute **status** = *12* (illuminated)
Synchronised lights	B-478.3		**status** =*15*. Synchronised lights may be associated using the collection feature **Association**
Strip light	B-478.5	9	See below for strip lights performing the function of an aid to navigation.
Spot light		11	Only to encode spot lights that are visible from seaward. The illuminated feature should be encoded using appropriate feature classes, with attribute **status** = *12* (illuminated)
Emergency light		17	Must be encoded as a separate feature to the main **Light feature**
Horizontally disposed lights	B-471.8	19	The number of lights must be encoded using attribute **multiplicity of lights**
Vertically disposed lights	B-471.8	20	The number of lights must be encoded using attribute **multiplicity of lights**

For ECDIS display reasons, where an encoded strip light serves the purpose of an aid to navigation, the attribute **category of light** = *9* (strip light) for the light feature should not be populated. To identify that the aid to navigation is a strip light, the complex attribute **information** should be populated with *Strip light* or equivalent for the light.

18.1.8 Light structures

Light features located in the water must have a master structure feature, generally a beacon (e.g. **Beacon Lateral**, **Beacon Special Purpose/General**) or other fixed structure (e.g. **Offshore Platform**), or a buoy structure (e.g. **Buoy Lateral**, **Buoy Special Purpose/General**) for floating aids to navigation. When a light is located in the water with no indication on the source of the structure feature, regardless of the height of the light, a **Pile** or **Beacon Special Purpose/General** feature should be encoded as the master feature. This will ensure that a symbol will be shown on ECDIS systems when the light features are not displayed during daytime navigation.

18.2   Light all around/single sectored

IHO Definition: **LIGHT**. A light is a luminous or lighted aid to navigation. (IHO Dictionary – S-32). An all around or single sectored light is a light with a single sector (which includes lights having a 360° sector), having no change in the characteristics of the light through the limit of the sector.				
S-101 Geo Feature: Light all around/single sectored (LIGHTS)				
Primitives: Point				
Real World		*Paper Chart Symbol*		*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of light	(CATLIT)	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	EN	0,*
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,*
Exhibition condition of light	(EXCLIT)	1 : light shown without change of character 2 : daytime light 3 : fog light 4 : night light	EN	0,1
Feature name			C	0,* (ordered)
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1

Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Height	(HEIGHT)		RE	0,1
Light visibility	(LITVIS)	1 : high intensity 2 : low intensity 3 : faint 4 : intensified 5 : unintensified 6 : visibility deliberately restricted 7 : obscured 8 : partially obscured 9 : visible in line of range	EN	0,*
Major light			BO	0,1
Marks navigational – system of	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 10 : other system 11 : CEVNI	EN	0,1
Multiplicity of lights	(MLTYLT)		IN	0,1
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Rhythm of light			C	1,1

Light characteristic	(LITCHR)	1 : fixed
		2 : flashing
		3 : long-flashing
		4 : quick-flashing
		5 : very quick-flashing
		6 : ultra quick-flashing
		7 : isophased
		8 : occulting
		9 : interrupted quick-flashing
		10 : interrupted very quick
		    flashing
		11 : interrupted ultra quick
		    flashing
		12 : morse
		13 : fixed and flash
		14 : flash and long-flash
		15 : occulting and flash
		16 : fixed and long-flash
		17 : occulting alternating
		18 : long-flash alternating
		19 : flash alternating
		25 : quick-flash plus long-
		    flash
		26 : very quick-flash plus
		    long flash
		27 : ultra quick-flash plus
		    long flash
		28 : alternating
		29 : fixed and alternating
		    flashing
			(S) EN	1,1

Signal group	(SIGGRP)		(S) IN	0,* (ordered)
Signal period	(SIGPER)		(S) RE	0,1
Signal sequence			(S) C	0,* (ordered)
Signal duration			(S) RE	1,1

Comment [j116]: MD8 – 8.Cl.8 and 8.Co.11.

Signal status		1 : lit 2 : eclipsed	(S) EN	1,1
Sector limit one	(SECTR1)		RE	0,1
Sector limit two	(SECTR2)		RE	0,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 11 : extinguished 14 : public 15 : synchronized 16 : watched 17 : un-watched	EN	0,*
Value of nominal range	(VALNMR)		RE	0,1
Vertical datum	(VERDAT)	1 : Mean low water springs 2 : Mean lower low water springs 3 : Mean sea level 4 : Lowest low water 5 : Mean low water 6 : Lowest low water springs 7 : Approximate mean low water springs 8 : Indian spring low water 9 : Low water springs 10 : Approximate lowest astronomical tide 11 : Nearly lowest low water 12 : Mean lower low water 13 : Low water 14 : Approximate mean low water 15 : Approximate mean lower low water 16 : Mean high water 17 : Mean high water springs 18 : High water 19 : Approximate mean sea level 20 : High water springs 21 : Mean higher high water 22 : Equinoctial spring low water 23 : Lowest astronomical tide 24 : Local datum 25 : International great lakes datum 1985 26 : Mean water level 27 : Lower low water large tide 28 : Higher high water large tide 29 : Nearly highest high water 30 : Highest astronomical tide (HAT)	EN	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*

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

INT 1 Reference: P 1-65

18.2.1 All-around and single sectored lights (see S-4 – B-470)

If it is required to encode a light that consists of only one sector (excluding single sector directional, fog detector and air obstruction lights), it must be done using the feature **Light All Around/Single Sectored**. This feature must be a slave feature of a master feature (see clause X.X), which is either the structure feature, or another light feature at the same position (if it exists and there is no structure feature available).

The IALA Maritime Buoyage System rules do not apply for most landfall lights and will apply to minor lights, but not to leading lights, some sector lights or major floating lights. In general, sector lights follow IALA convention when used for marking a channel.

Further guidance for encoding various types and characteristics of lights can be found in clauses X.X to X.X.

Remarks:
- For all-around lights, the attributes **sector limit one** and **sector limit two** must not be populated.
- If it is required to encode details of the lighting technology (e.g. neon), it must be done using the complex attribute **information**.
- If it is required to encode the purpose of a marine spotlight, it must be done using **information**.
- The attribute **vertical datum** applies only to **height**; this value must only be encoded if it is different to the value encoded in the VDAT subfield of the "Coordinate Reference System Header field" [CRSH] field, or different to the value of **vertical datum** encoded on meta feature **Vertical Datum of Data**.
- Names of major lights are very important. If a light has a name which is unrelated to any other encoded feature, the name must be populated using the complex attribute **feature name** on at least the largest scale maximum display scale ENC data. If the name of a light is obviously that of the named feature on which the light stands, e.g. Saint Catherine's Point, the name of the light need not be repeated for the light.

18.2.1.1 Types and functions of lights (see S-4 – B-471.1)

If it is required to encode types and functions of lights, this must be done using the attribute **category of light** (see clause X.X).

Distinction: Beacon, cardinal; beacon, isolated danger; beacon, lateral; beacon, safe water; beacon, special purpose/general; buoy, cardinal; buoy, installation; buoy, isolated danger; buoy, lateral; buoy, safe water; buoy, special purpose/general; light air obstruction; light directional; light float; light fog detector; light multi-sectored; light vessel.

18.3   Light multi-sectored

IHO Definition: **LIGHT**. A light is a luminous or lighted aid to navigation. (IHO Dictionary – S-32). A multi-sectored light is a light having two or more sectors which have different characteristics across, and sometimes within, each sector.				

S-101 Geo Feature: Light multi-sectored (LIGHTS)

Primitives: Point

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Feature name			C	0,* (ordered)
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Height	(HEIGHT)		RE	0,1
Light sector			C	2,*
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	(S) EN	1,*
Exhibition condition of light	(EXCLIT)	1 : light shown without change of character 2 : daytime light 3 : fog light 4 : night light	(S) EN	0,1
Directional			(S) BO	0,1
Light characteristic	(LITCHR)	1 : fixed 2 : flashing 3 : long-flashing 4 : quick-flashing 5 : very quick-flashing 6 : ultra quick-flashing 7 : isophased 8 : occulting 9 : interrupted quick-flashing	(S) EN	0,1

		10 : interrupted very quick flashing 11 : interrupted ultra quick flashing 12 : morse 13 : fixed and flash 14 : flash and long-flash 15 : occulting and flash 16 : fixed and long-flash 17 : occulting alternating 18 : long-flash alternating 19 : flash alternating 25 : quick-flash plus long-flash 26 : very quick-flash plus long flash 27 : ultra quick-flash plus long flash 28 : alternating 29 : fixed and alternating flashing		
Light visibility	(LITVIS)	1 : high intensity 2 : low intensity 3 : faint 4 : intensified 5 : unintensified 6 : visibility deliberately restricted 7 : obscured 8 : partially obscured 9 : visible in line of range	(S) EN	0,*
Orientation			(S) C	0,1
Orientation uncertainty			(S) RE	0,1
Orientation value	(ORIENT)		(S) RE	1,1
Sector limit one	(SECTR1)		(S) RE	1,1
Sector limit two	(SECTR2)		(S) RE	1,1
Value of nominal range	(VALNMR)		(S) RE	0,1
Information			(S) C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Marks navigational – system of	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 10 : other system 11 : CEVNI	EN	0,1
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Rhythm of light			C	1,1
Light characteristic	(LITCHR)	1 : fixed 2 : flashing 3 : long-flashing 4 : quick-flashing 5 : very quick-flashing 6 : ultra quick-flashing 7 : isophased 8 : occulting 9 : interrupted quick-flashing 10 : interrupted very quick flashing	(S) EN	0,1

Comment [j117]: MD8 – 8.Cl.8 and 8.Co.11.

		11 : interrupted ultra quick flashing 12 : morse 13 : fixed and flash 14 : flash and long-flash 15 : occulting and flash 16 : fixed and long-flash 17 : occulting alternating 18 : long-flash alternating 19 : flash alternating 25 : quick-flash plus long-flash 26 : very quick-flash plus long flash 27 : ultra quick-flash plus long flash 28 : alternating 29 : fixed and alternating flashing		
Signal group	(SIGGRP)		(S) IN	0,* (ordered)
Signal period	(SIGPER)		(S) RE	0,1
Signal sequence			(S) C	0,* (ordered)
Signal duration			(S) RE	1,1
Signal status		1 : lit 2 : eclipsed	(S) EN	1,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 11 : extinguished 14 : public 15 : synchronized 16 : watched 17 : un-watched	EN	0,*
Vertical datum	(VERDAT)	1 : Mean low water springs 2 : Mean lower low water springs 3 : Mean sea level 4 : Lowest low water 5 : Mean low water 6 : Lowest low water springs 7 : Approximate mean low water springs 8 : Indian spring low water 9 : Low water springs 10 : Approximate lowest astronomical tide 11 : Nearly lowest low water 12 : Mean lower low water 13 : Low water 14 : Approximate mean low water 15 : Approximate mean lower low water 16 : Mean high water 17 : Mean high water springs 18 : High water 19 : Approximate mean sea level 20 : High water springs 21 : Mean higher high water 22 : Equinoctial spring low water	EN	0,1

Comment [j118]: MD8 – 8.Cl.8 and 8.Co.11.

		~~23 : Lowest astronomical tide~~ 24 : Local datum 25 : International great lakes datum 1985 26 : Mean water level ~~27 : Lower low water large tide~~ 28 : Higher high water large tide 29 : Nearly highest high water 30 : Highest astronomical tide (HAT)		
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
~~Recording date~~	~~(RECDAT)~~	~~ISO 8601:1988~~	~~DA~~	~~0,1~~
~~Recording indication~~	~~(RECIND)~~		~~TE~~	~~0,1~~
~~Source indication~~			~~C~~	~~0,*~~
~~ Authority~~			~~(S) TE~~	~~1,1~~
~~ Nationality~~			~~(S) TE~~	~~1,1~~
~~ ID code~~			~~(S) TE~~	~~0,1~~
~~ Source~~			~~(S) TE~~	~~0,1~~
~~ Source date~~	~~(SORDAT)~~	~~ISO 8601:1988~~	~~(S) DA~~	~~1,1~~

INT 1 Reference: P 1-65

18.3.1 Multi-sectored lights (see S-4 – B-475)

If it is required to encode a light that consists of more than one sector, it must be done using the feature **Light Multi-sectored**. This feature must be a slave feature of a master feature (see clause X.X), which is either the structure feature, or another light feature at the same position (if it exists and there is no structure feature available).

The IALA Maritime Buoyage System rules do not apply for most landfall lights and will apply to minor lights, but not to leading lights, some sector lights or major floating lights. In general, sector lights follow IALA convention when used for marking a channel.

Further guidance for encoding various types and characteristics of lights can be found in clauses X.X to X.X.
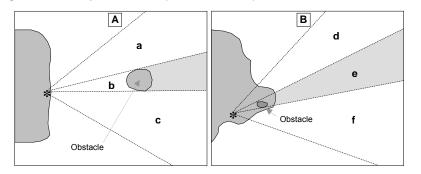
Remarks:
- The complex attribute **light sector** is used to populate each sector for the light, except for sectors in which there is deliberately no light exhibited.
- The sub-attribute **light characteristic** must be populated on either each iteration of the complex attribute **light sector** if sectors have different characteristics (e.g. for complex (oscillating) light sectors (see clause X.X.X.X below)), or on the complex attribute **rhythm of light** (if all sectors have the same characteristic).
- If a sector of multi-sectored light is intended to have a directional function, this should be encoded using the **light sector** complex sub-attribute **orientation**. If the light is intensified in this sector, **light sector** sub-attribute **light visibility = 4** (intensified) must be populated. A single sectored light having a directional function must be encoded using the feature **Light Directional** (see clause X.X).
- The fairway defined by the succession of navigable areas in the white sectors of a series of **Light Multi-sectored** features may be encoded using the feature **Fairway** (see clause X.X).
- If there is additional information required to be encoded that is relevant to all sectors of the light, this must be done using the complex attribute **information** for the **Light Multi-sectored** feature. If the additional information is relevant to individual sectors of the light only (e.g. for complex (oscillating) light sectors (see

clause X.X.X.X below)), this must be encoded using the complex sub-attribute **information** for the complex attribute **light sector**.

- If it is required to encode details of the lighting technology (e.g. neon), it must be done using the complex attribute **information**.
- The attribute **vertical datum** applies only to **height**; this value must only be encoded if it is different to the value encoded in the VDAT subfield of the "Coordinate Reference System Header field" [CRSH] field, or different to the value of **vertical datum** encoded on meta feature **Vertical Datum of Data**.
- Names of major lights are very important. If a light has a name which is unrelated to any other encoded feature, the name must be populated using the complex attribute **feature name** on at least the largest scale maximum display scale ENC data. If the name of a light is obviously that of the named feature on which the light stands, e.g. Saint Catherine's Point, the name of the light need not be repeated for the light.

18.3.1.1 Lights obscured by obstructions (see S-4 – B-475.3)

If an encoded light is obscured in a part of the navigable area of a sector (see Figure A above) beyond an offshore obstruction, it must be encoded using **Light Multi-sectored**, with each of the sectors (a) – (c) encoded using the complex attribute **light sector**. The partially obscured sector of (b), seaward of the island, must have **light sector** with sub-attributes **light visibility = 8** (partially obscured) and **information** (**text**) = *Sector obscured only beyond …..* The sectors in which the light is visible from seaward ((a) and (c)) must be encoded as separate iterations of **light sector**.

If there is no navigable water between the light and the obstacle (see (e) in Figure B above), the masked sector must be encoded using **light sector**, with sub-attribute **light visibility = 3** (faint) or *7* (obscured). The sectors in which the light is visible from seaward ((d) and (f)) must be encoded as separate iterations of **light sector**.

18.3.1.2 Oscillating light sectors

Evolving technology in the development of navigational lights has resulted in the installation of complex directional navigation lights with multiple sectors, colours and characteristics, some with oscillating sectors, in many areas where navigation is restricted. These lights may have up to 7 sectors, with the central sector being a very narrow, sometimes intensified, fixed white sector performing the directional function of the light. In the IALA A System, the sectors flanking this directional light may be alternating and oscillate increasingly from white to green (to starboard) and red (to port) with increasing deviation from the track defined by the directional light. These lights will normally be flanked by narrow sectors of fixed green (to starboard) and red (to port). Additionally, there may be outer sectors that are occulting green (to starboard) and red (to port) which oscillate with increasing period of eclipse to isophased or flashing with increasing deviation from the track defined by the directional light. For the IALA B System the colours are reversed. In some cases these complex lights may not conform to IALA. Each of the outer sectors may be very narrow.

If is required to encode an oscillating light sector, it should be done using a **Light Multi-sectored** feature, with iterations of the complex attribute **light sector** as follows:

For light sectors in the IALA A system that are alternating and oscillate increasingly from white to green (to starboard) and red (to port) with increasing deviation from the track defined by the directional light:

light sector: light characteristic = *28* (Alternating); colour = *1,2* (White, Red); sector limit one; sector limit two; information (**text**) = *White phase decreases as bearing to light increases*

light sector: light characteristic = *28* (Alternating); colour = *1,4* (White, Green); sector limit one; sector limit two; information (**text**) = *White phase increases as bearing to light increases*

For lights in the IALA B system that are alternating and oscillate increasingly from white to red (to starboard)

and green (to port) with increasing deviation from the track defined by the directional light; transpose the colours red and green in the above encoding.

For lights in the IALA A system that are occulting green (to starboard) and red (to port) which oscillate with increasing period of eclipse to isophased or flashing with increasing deviation from the track defined by the directional light:

light sector: **light characteristic** = *8* (Occulting); **colour** = *3* (Red); **sector limit one**; **sector limit two**; **information** (**text**) = *Light phase decreases as bearing to light increases*

light sector: **light characteristic** = *8* (Occulting); **colour** = *4* (Green); **sector limit one**; **sector limit two**; **information** (**text**) = *Light phase increases as bearing to light increases*

For lights in the IALA B system that are occulting red (to starboard) and green (to port) which oscillate with increasing period of eclipse to isophased or flashing with increasing deviation from the track defined by the directional light; transpose the colours red and green in the above encoding.

Oscillating lights which are not IALA should be encoded similar to the above. For instance, where a light contains white sectors that are occulting and oscillate with increasing period of eclipse to isophased or flashing with increasing deviation from the track defined by the directional light:

For the sector to port of the track defined by the directional light:

light sector: **light characteristic** = *8* (Occulting); **colour** = *1* (White); **sector limit one**; **sector limit two**; **information** (**text**) = *Light phase decreases as bearing to light increases*

For the sector to starboard of the track defined by the directional light:

light sector: **light characteristic** = *8* (Occulting); **colour** = *1* (White); **sector limit one**; **sector limit two**; **information** (**text**) = *Light phase increases as bearing to light increases*

All other light sectors must be encoded using additional iterations of **light sector**, with sub-attributes (including **light characteristic**) populated in accordance with the characteristics of the sector.

Distinction: Beacon, cardinal; beacon, isolated danger; beacon, lateral; beacon, safe water; beacon, special purpose/general; buoy, cardinal; buoy, installation; buoy, isolated danger; buoy, lateral; buoy, safe water; buoy, special purpose/general; light air obstruction; light all around/single sectored ; light directional; light float; light fog detector; light vessel.

18.4   Light directional

IHO Definition: **DIRECTIONAL LIGHT**. A light is a luminous or lighted aid to navigation. (IHO Dictionary – S-32).
A directional light is a light illuminating a sector of very narrow angle and intended to mark a direction to follow. (IHO Dictionary – S-32).

S-101 Geo Feature: Light directional (LIGHTS)

Primitives: Point

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,*
Exhibition condition of light	(EXCLIT)	1 : light shown without change of character 2 : daytime light 3 : fog light 4 : night light	EN	0,1
Feature name			C	0,* (ordered)
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Height	(HEIGHT)		RE	0,1
Light visibility	(LITVIS)	1 : high intensity 2 : low intensity 3 : faint 4 : intensified 5 : unintensified 6 : visibility deliberately restricted 7 : obscured 8 : partially obscured 9 : visible in line of range	EN	0,*

Marks navigational – system of	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 10 : other system 11 : CEVNI	EN	0,1
Moiré effect			BO	0,1
Multiplicity of lights	(MLTYLT)		IN	0,1
Orientation			C	1,1
Orientation uncertainty			(S) RE	0,1
Orientation value	(ORIENT)		(S) RE	1,1
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Rhythm of light			C	1,1
Light characteristic	(LITCHR)	1 : fixed 2 : flashing 3 : long-flashing 4 : quick-flashing 5 : very quick-flashing 6 : ultra quick-flashing 7 : isophased 8 : occulting 9 : interrupted quick-flashing 10 : interrupted very quick flashing 11 : interrupted ultra quick flashing 12 : morse 13 : fixed and flash 14 : flash and long-flash 15 : occulting and flash 16 : fixed and long-flash 17 : occulting alternating 18 : long-flash alternating 19 : flash alternating 25 : quick-flash plus long-flash 26 : very quick-flash plus long flash 27 : ultra quick-flash plus long flash 28 : alternating 29 : fixed and alternating flashing	(S) EN	1,1
Signal group	(SIGGRP)		(S) IN	0,* (ordered)
Signal period	(SIGPER)		(S) RE	0,1
Signal sequence			(S) C	0,* (ordered)
Signal duration			(S) RE	1,1
Signal status		1 : lit 2 : eclipsed	(S) EN	1,1
Sector limit one	(SECTR1)		RE	0,1
Sector limit two	(SECTR2)		RE	0,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private	EN	0,*

Comment [j119]: MD8 – 8.Cl.8 and 8.Co.11.

		11 : extinguished 14 : public 15 : synchronized 16 : watched 17 : un-watched		
Value of nominal range	(VALNMR)		RE	0,1
Vertical datum	(VERDAT)	1 : Mean low water springs 2 : Mean lower low water springs 3 : Mean sea level 4 : Lowest low water 5 : Mean low water 6 : Lowest low water springs 7 : Approximate mean low water springs 8 : Indian spring low water 9 : Low water springs 10 : Approximate lowest astronomical tide 11 : Nearly lowest low water 12 : Mean lower low water 13 : Low water 14 : Approximate mean low water 15 : Approximate mean lower low water 16 : Mean high water 17 : Mean high water springs 18 : High water 19 : Approximate mean sea level 20 : High water springs 21 : Mean higher high water 22 : Equinoctial spring low water 23 : Lowest astronomical tide 24 : Local datum 25 : International great lakes datum 1985 26 : Mean water level 27 : Lower low water large tide 28 : Higher high water large tide 29 : Nearly highest high water 30 : Highest astronomical tide (HAT)	EN	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1

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

<u>INT 1 Reference:</u> P 1-65

18.4.1 Directional lights (see S-4 – B-470)

Directional (or direction) lights of several types are in use but all have in common a very narrow sector intended to mark a direction to be followed. The narrow sector may be flanked by:

- Unlit sectors or unintensified light.
- Sectors of different colour or character. Some direction lights are so precise that a complete colour change at a sector boundary occurs over an angle of less than 1 minute (0·02°). This corresponds to a lateral distance of just 1 metre at a viewing distance of 3.5 km. In addition the intensity may be maintained right to the edge of the beam, and does not reduce the further the observer is away from the axis.

A moiré effect mark (or variable arrow mark) is a short-range (normally up to 2 km) type of directional "light". Sodium lighting gives a yellow background to a screen (up to 3 m square) on which a vertical black line will be seen by an observer on the centreline, or variable arrow marks when course alteration is needed. The system can be used by day and night. It can also be used as a stop line (seen abeam) for vessels berthing along quays.

If it is required to encode a narrow single sectored light having a directional function, it must be done using the feature **Light Directional**. This feature must be a slave feature of a master feature (see clause X.X), which is either the structure feature, or another light feature at the same position (if it exists and there is no structure feature available).

The IALA Maritime Buoyage System rules do not apply for most landfall lights and will apply to minor lights, but not to leading lights, some sector lights or major floating lights. In general, sector lights follow IALA convention when used for marking a channel.

Further guidance for encoding various types and characteristics of lights can be found in clauses X.X to X.X.

<u>Remarks:</u>

- If it is required to encode a single sectored directional light that comprises a narrow (and sometimes intensified) sector, the sector must be encoded using the attributes **sector limit one** and **sector limit two**, and the mandatory complex attribute **orientation** must be populated with an empty (null) value. A directional light sector that is included in a multi-sectored light must be encoded as **Light Multi-sectored** (see clause X.X).
- The mandatory complex attribute **orientation** must only be encoded to indicate the orientation, measured from seaward, of the leading line of the directional light when the attributes **sector limit one** and **sector limit two** are not populated, and there is no **Recommended Track** or **Navigation Line** feature associated with the directional light. Where the **Light Directional** has attributes **sector limit one** and **sector limit two**, and/or there is an associated **Recommended Track** and/or **Navigation Line**, orientation (**orientation value**) for the **Light Directional** must be populated with an empty (null) value.
- For moiré effect lights, the attribute **moiré effect** must be set to *True*.
- If it is required to encode details of the lighting technology (e.g. neon), it must be done using the complex attribute **information**.
- The attribute **vertical datum** applies only to **height**; this value must only be encoded if it is different to the value encoded in the VDAT subfield of the "Coordinate Reference System Header field" [CRSH] field, or different to the value of **vertical datum** encoded on meta feature **Vertical Datum of Data**.
- Names of major lights are very important. If a light has a name which is unrelated to any other encoded feature, the name must be populated using the complex attribute **feature name** on at least the largest scale maximum display scale ENC data. If the name of a light is obviously that of the named feature on which the light stands, e.g. Saint Catherine's Point, the name of the light need not be repeated for the light.
- If it is required to encode the recommended track and/or navigation line associated with a directional light, it must be done using the methods described in clause X.X.

<u>Distinction:</u> Beacon, cardinal; beacon, isolated danger; beacon, lateral; beacon, safe water; beacon, special purpose/general; buoy, cardinal; buoy, installation; buoy, isolated danger; buoy, lateral; buoy, safe water; buoy, special purpose/general; light air obstruction; light all around/single sectored; light float; light fog detector; light multi-sectored; light vessel.

18.5   Light fog detector

IHO Definition: **FOG DETECTOR LIGHT**. A light is a luminous or lighted aid to navigation. (IHO Dictionary – S-32). A fog detector light is a light used to automatically determine conditions of visibility which warrant the turning on or off of a sound signal. (IHO Dictionary – S-32).	

S-101 Geo Feature: Light fog detector (LIGHTS)

Primitives: Point

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Exhibition condition of light	(EXCLIT)	1 : light shown without change of character 2 : daytime light 3 : fog light 4 : night light	EN	0,1
Feature name			C	0,* (ordered)
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Height	(HEIGHT)		RE	0,1
Light visibility	(LITVIS)	1 : high intensity 2 : low intensity 3 : faint 4 : intensified 5 : unintensified 6 : visibility deliberately restricted 7 : obscured 8 : partially obscured 9 : visible in line of range	EN	0,*

~~Marks navigational – system of~~	~~(MARSYS)~~	~~1 : IALA A~~ ~~2 : IALA B~~ ~~9 : no system~~ ~~10 : other system~~ ~~11 : CEVNI~~	~~EN~~	~~0,1~~
~~Multiplicity of lights~~	~~(MLTYLT)~~		~~IN~~	~~0,1~~
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Rhythm of light			C	0,1
Light characteristic	(LITCHR)	1 : fixed 2 : flashing 3 : long-flashing 4 : quick-flashing 5 : very quick-flashing 6 : ultra quick-flashing 7 : isophased 8 : occulting 9 : interrupted quick-flashing 10 : interrupted very quick flashing 11 : interrupted ultra quick flashing 12 : morse 13 : fixed and flash 14 : flash and long-flash 15 : occulting and flash 16 : fixed and long-flash 17 : occulting alternating 18 : long-flash alternating 19 : flash alternating 25 : quick-flash plus long-flash 26 : very quick-flash plus long flash 27 : ultra quick-flash plus long flash 28 : alternating 29 : fixed and alternating flashing	(S) EN	1,1
Signal group	(SIGGRP)		(S) IN	0,* (ordered)
Signal period	(SIGPER)		(S) RE	0,1
Signal sequence			(S) C	0,* (ordered)
Signal duration			(S) RE	1,1
Signal status		1 : lit 2 : eclipsed	(S) EN	1,1
~~Sector limit one~~	~~(SECTR1)~~		~~RE~~	~~0,1~~
~~Sector limit two~~	~~(SECTR2)~~		~~RE~~	~~0,1~~
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 11 : extinguished 14 : public 15 : synchronized 16 : watched 17 : un-watched	EN	0,*

Comment [j120]: MD8 – 8.Cl.8 and 8.Co.11.

Value of nominal range	(VALNMR)		RE	0,1
Vertical datum	(VERDAT)	1 : Mean low water springs 2 : Mean lower low water springs 3 : Mean sea level 4 : Lowest low water 5 : Mean low water 6 : Lowest low water springs 7 : Approximate mean low water springs 8 : Indian spring low water 9 : Low water springs 10 : Approximate lowest astronomical tide 11 : Nearly lowest low water 12 : Mean lower low water 13 : Low water 14 : Approximate mean low water 15 : Approximate mean lower low water 16 : Mean high water 17 : Mean high water springs 18 : High water 19 : Approximate mean sea level 20 : High water springs 21 : Mean higher high water 22 : Equinoctial spring low water 23 : Lowest astronomical tide 24 : Local datum 25 : International great lakes datum 1985 26 : Mean water level 27 : Lower low water large tide 28 : Higher high water large tide 29 : Nearly highest high water 30 : Highest astronomical tide (HAT)	EN	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: P 1-65

18.5.1 Fog detector lights (see S-4 – B-470)

If it is required to encode a light used to automatically determine conditions of visibility which warrant the turning on or off of a sound signal, it must be done using the feature **Light Fog Detector**. This feature must be a slave feature of a master feature (see clause X.X), which is either the structure feature, or another light feature at the same position (if it exists and there is no structure feature available).

Further guidance for encoding various types and characteristics of lights can be found in clauses X.X to X.X.

Remarks:
- If it is required to encode details of the lighting technology (e.g. neon), it must be done using the complex attribute **information**.
- The attribute **vertical datum** applies only to **height**; this value must only be encoded if it is different to the value encoded in the VDAT subfield of the "Coordinate Reference System Header field" [CRSH] field, or different to the value of **vertical datum** encoded on meta feature **Vertical Datum of Data**.

Distinction: Beacon, cardinal; beacon, isolated danger; beacon, lateral; beacon, safe water; beacon, special purpose/general; buoy, cardinal; buoy, installation; buoy, isolated danger; buoy, lateral; buoy, safe water; buoy, special purpose/general; light air obstruction; light all around/single sectored; light directional; light float; light multi-sectored; light vessel.

18.6   Light air obstruction

IHO Definition: **AIR OBSTRUCTION LIGHT**. A light is a luminous or lighted aid to navigation. (IHO Dictionary – S-32).

An air obstruction light is a light marking an obstacle which constitutes a danger to air navigation. (IHO Dictionary – S-32).

S-101 Geo Feature: Light air obstruction (LIGHTS)

Primitives: Point

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Exhibition condition of light	(EXCLIT)	1 : light shown without change of character 2 : daytime light 3 : fog light 4 : night light	EN	0,1
Feature name			C	0,* (ordered)
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Height	(HEIGHT)		RE	0,1
Light visibility	(LITVIS)	1 : high intensity 2 : low intensity 3 : faint 4 : intensified 5 : unintensified 6 : visibility deliberately restricted 7 : obscured 8 : partially obscured 9 : visible in line of range	EN	0,*

~~Marks navigational – system of~~	~~(MARSYS)~~	~~1 : IALA A~~ ~~2 : IALA B~~ ~~9 : no system~~ ~~10 : other system~~ ~~11 : CEVNI~~	~~EN~~	~~0,1~~
Multiplicity of lights	(MLTYLT)		IN	0,1
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Rhythm of light			C	0,1
Light characteristic	(LITCHR)	1 : fixed 2 : flashing 3 : long-flashing 4 : quick-flashing 5 : very quick-flashing 6 : ultra quick-flashing 7 : isophased 8 : occulting 9 : interrupted quick-flashing 10 : interrupted very quick flashing 11 : interrupted ultra quick flashing 12 : morse 13 : fixed and flash 14 : flash and long-flash 15 : occulting and flash 16 : fixed and long-flash 17 : occulting alternating 18 : long-flash alternating 19 : flash alternating 25 : quick-flash plus long-flash 26 : very quick-flash plus long flash 27 : ultra quick-flash plus long flash 28 : alternating 29 : fixed and alternating flashing	(S) EN	1,1
Signal group	(SIGGRP)		(S) IN	0,* (ordered)
Signal period	(SIGPER)		(S) RE	0,1
Signal sequence			(S) C	0,* (ordered)
Signal duration			(S) RE	1,1
Signal status		1 : lit 2 : eclipsed	(S) EN	1,1
~~Sector limit one~~	~~(SECTR1)~~		~~RE~~	~~0,1~~
~~Sector limit two~~	~~(SECTR2)~~		~~RE~~	~~0,1~~
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 11 : extinguished 14 : public 15 : synchronized 16 : watched 17 : un-watched	EN	0,*

Comment [j121]: MD8 – 8.Cl.8 and 8.Co.11.

Value of nominal range	(VALNMR)		RE	0,1
Vertical datum	(VERDAT)	~~1 : Mean low water springs~~ ~~2 : Mean lower low water springs~~ 3 : Mean sea level ~~4 : Lowest low water~~ ~~5 : Mean low water~~ ~~6 : Lowest low water springs~~ ~~7 : Approximate mean low water springs~~ ~~8 : Indian spring low water~~ ~~9 : Low water springs~~ ~~10 : Approximate lowest astronomical tide~~ ~~11 : Nearly lowest low water~~ ~~12 : Mean lower low water~~ ~~13 : Low water~~ ~~14 : Approximate mean low water~~ ~~15 : Approximate mean lower low water~~ 16 : Mean high water 17 : Mean high water springs 18 : High water 19 : Approximate mean sea level 20 : High water springs 21 : Mean higher high water ~~22 : Equinoctial spring low water~~ ~~23 : Lowest astronomical tide~~ 24 : Local datum 25 : International great lakes datum 1985 26 : Mean water level ~~27 : Lower low water large tide~~ 28 : Higher high water large tide 29 : Nearly highest high water 30 : Highest astronomical tide (HAT)	EN	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
~~Recording date~~	~~(RECDAT)~~	~~ISO 8601:1988~~	~~DA~~	~~0,1~~
~~Recording indication~~	~~(RECIND)~~		~~TE~~	~~0,1~~
~~Source indication~~			~~C~~	~~0,*~~
~~Authority~~			~~(S) TE~~	~~1,1~~
~~Nationality~~			~~(S) TE~~	~~1,1~~
~~ID code~~			~~(S) TE~~	~~0,1~~
~~Source~~			~~(S) TE~~	~~0,1~~
~~Source date~~	~~(SORDAT)~~	~~ISO 8601:1988~~	~~(S) DA~~	~~1,1~~

18.6.1   Air obstruction lights (see S-4 – B-470)

If it is required to encode a light marking an obstacle which constitutes a danger to air navigation, which may also be used as a marine navigational aid, it must be done using the feature **Light Air Obstruction**. This feature must be a slave feature of a master feature (see clause X.X), which is either the structure feature, or another light feature at the same position (if it exists and there is no structure feature available).

Further guidance for encoding various types and characteristics of lights can be found in clauses X.X to X.X.

Remarks:
- If it is required to encode details of the lighting technology (e.g. neon), it must be done using the complex attribute **information**.
- The attribute **vertical datum** applies only to **height**; this value must only be encoded if it is different to the value encoded in the VDAT subfield of the "Coordinate Reference System Header field" [CRSH] field, or different to the value of **vertical datum** encoded on meta feature **Vertical Datum of Data**.

Distinction: Beacon, cardinal; beacon, isolated danger; beacon, lateral; beacon, safe water; beacon, special purpose/general; buoy, cardinal; buoy, installation; buoy, isolated danger; buoy, lateral; buoy, safe water; buoy, special purpose/general; light all around/single sectored; light directional; light float; light fog detector; light multi-sectored; light vessel.

19 Buoys, Beacons

19.1   Daymark

IHO Definition: **DAYMARK**. The identifying characteristics of an aid to navigation which serve to facilitate its recognition against a daylight viewing background. On those structures that do not by themselves present an adequate viewing area to be seen at the required distance, the aid is made more visible by affixing a daymark to the structure. A daymark so affixed has a distinctive colour and shape depending on the purpose of the aid. (IHO Dictionary – S-32, Edition 5).

S-101 Geo Feature: Daymark (DAYMAR)

Primitives: Point

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of special purpose mark	(CATSPM)	1 : firing danger area mark 2 : target mark 3 : marker ship mark 4 : degaussing range mark 5 : barge mark 6 : cable mark 7 : spoil ground mark 8 : outfall mark 9 : ODAS (Ocean Data Acquisition System) 10 : recording mark 11 : seaplane anchorage mark 12 : recreation zone mark 14 : mooring mark 15 : LANBY (Large Automatic Navigational Buoy) 16 : leading mark 17 : measured distance mark 18 : notice mark 19 : TSS mark (Traffic Separation Scheme) 20 : anchoring prohibited mark 21 : berthing prohibited mark 22 : overtaking prohibited mark 23 : two-way traffic prohibited mark 24 : reduced wake mark 25 : speed limit mark 26 : stop mark 27 : general warning mark 28 : sound ship's siren mark 29 : restricted vertical clearance mark 30 : maximum vessel's draught mark 31 : restricted horizontal clearance mark 32 : strong current warning mark 33 : berthing permitted mark	EN	0,*

Comment [j122]: MD8 – 7.Co.10.

		34 : overhead power cable mark 35 : channel edge gradient' mark 36 : telephone mark 37 : ferry crossing mark 39 : pipeline mark 40 : anchorage mark 41 : clearing mark 42 : control mark 43 : diving mark 44 : refuge beacon 45 : foul ground mark 46 : yachting mark 47 : heliport mark 48 : GNSS mark 49 : seaplane landing mark 50 : control mark 51 : work in progress mark 52 : mark with unknown purpose 53 : wellhead mark 54 : channel separation mark 55 : marine farm mark 56 : artificial reef mark 57 : ice mark 58 : nature reserve mark		
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Elevation	(ELEVAT)		RE	0,1
Feature name			C	0,* (ordered)
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Height	(HEIGHT)		RE	0,1

Comment [j123]: S-57 Extension 06/01.

Nature of construction	(NATCON)	1 : masonry 2 : concreted 4 : hard surfaced 6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted 10 : latticed	EN	0,*
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 12: illuminated	EN	0,*
Topmark/daymark shape	(TOPSHP)	1 : cone, point up 2 : cone, point down 3 : sphere 4 : 2 spheres 5 : cylinder (can) 6 : board 7 : x-shape (St. Andrew's cross) 8 : upright cross (St George's cross) 9 : cube, point up 10 : 2 cones, point to point 11 : 2 cones, base to base 12 : rhombus (diamond) 13 : 2 cones (points upward) 14 : 2 cones (points downward) 15 : besom, point up (broom or perch) 16 : besom, point down (broom or perch) 17 : flag 18 : sphere over rhombus 19 : square 20 : rectangle, horizontal 21 : rectangle, vertical 22 : trapezium, up 23 : trapezium, down 24 : triangle, point up 25 : triangle, point down 26 : circle 27 : two upright crosses (one over the other) 28 : T-shape 29 : triangle pointing up over a circle 30 : upright cross over a circle 31 : rhombus over a circle 32 : circle over a triangle pointing up 33 : other shape (see INFORM)	EN	0,1
Vertical length	(VERLEN)		RE	0,1
Information			C	0,*

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

INT 1 Reference: Q 101

19.1.1 Daymarks (see S-4 – B-455.9)

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

The term "daymark" may also simply refer to any unlighted aid to navigation, and encoders may choose to encode **Daymark** instead of **Beacon Special Purpose/General**, particularly for leading marks (see clause X.X). In North America, the term "daybeacon" is used for an unlit beacon.

Remarks:
- The attribute **colour pattern** must be populated if more than one value is populated for the   mandatory attribute **colour**.
- If it is required to encode the altitude of the ground level above the vertical datum at the position of a daymark, it must be done using the attribute **elevation**, but only for beacons built on land.
- If it is required to encode the total altitude of a daymark, including any equipment features (e.g. light), above the vertical datum, it must be done using the attribute **height**.
- If it is required to encode the total vertical length of a daymark, including any equipment features (e.g. light), above the seabed or ground, it must be done using the attribute **vertical length**.
- If it is required to encode a cairn that bears the colour(s) specified by a navigational system of marks, it must be done using a beacon feature.
- If it is required to encode a daymark that has more than one colour, the attributes **colour** and **colour pattern** must be encoded, according to the rules laid out in clause X.X.

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

19.2 Lateral buoys

IHO Definition: **BUOY LATERAL MARKS**. A buoy is a floating object moored to the bottom in a particular place, as an aid to navigation or for other specific purposes. (IHO Dictionary – S-32).

A lateral buoy is used to indicate the port or starboard hand side of the route to be followed. They are generally used for well defined channels and are used in conjunction with a conventional direction of buoyage. (UKHO NP 735, 5th Edition).

S-101 Geo Feature: Buoy lateral (BOYLAT)

Primitives: Point

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Buoy shape	(BOYSHP)	1 : conical (nun, ogival) 2 : can (cylindrical) 3 : spherical 4 : pillar 5 : spar (spindle) 6 : barrel (tun) 7 : superbuoy 8 : ice buoy	EN	1,1
Category of lateral mark	(CATLAM)	1 : port-hand lateral mark 2 : starboard-hand lateral mark 3 : preferred channel to starboard lateral mark 4 : preferred channel to port lateral mark	EN	1,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1

Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Marks navigational – system of	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 10 : other system 11 : CEVNI	EN	0,1
Nature of construction	(NATCON)	6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted 10 : latticed	EN	0,*
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 5 : periodic/intermittent 7 : temporary 8 : private 18 : existence doubtful	EN	0,*
Topmark	(**TOPMAR**)		C	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	(S) EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	(S) EN	0,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Topmark/daymark shape	(TOPSHP)	1 : cone, point up 2 : cone, point down 3 : sphere 4 : 2 spheres 5 : cylinder (can) 6 : board 7 : x-shape (St. Andrew's cross) 8 : upright cross (St George's cross)	(S) EN	1,1

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

INT 1 Reference: Q 130.1

19.2.1 Lateral buoys (see S-4 – B-461.3 and B-467)

Lateral buoys are generally used for well defined channels, in conjunction with a direction of buoyage. They indicate the port and starboard sides of the route to be followed.

To conform to the IALA Maritime Buoyage System (see clause X.X), port hand buoys are usually can shaped, but may be another shape (except conical or spherical). Other shaped buoys have a can topmark. The colour of port hand buoys, topmarks and lights (if fitted) will be red in IALA region A and green in IALA region B.

To conform to the IALA Maritime Buoyage System, starboard hand buoys are usually conical shaped, but may be another shape (except can or spherical). Other shaped buoys have a conical topmark. The colour of starboard hand buoys, topmarks and lights (if fitted) will be green in IALA region A and red in IALA region B.

A preferred channel mark is a modified lateral mark, with horizontal colour bands. The shape and predominant colour indicates which side is the preferred channel, the other colour indicates the secondary channel. If fitted, the light is Fl(2+1), the colour indicating the preferred channel.

If it is required to encode a buoy having the function of a lateral mark, it must be done using the feature **Buoy Lateral**.

Remarks:
- The attribute **colour pattern** must be populated if more than one value is populated for the mandatory attribute **colour**.
- For the complex attribute **topmark**, the sub-attribute **colour pattern** must be populated if more than one value is populated for the mandatory sub-attribute **colour**.
- If it is required to encode the total vertical length, including the topmark and any equipment features (e.g. light), of the buoy above the water level, it must be done using the attribute **vertical length**.

Distinction: Buoy, cardinal; buoy, emergency wreck marking; buoy, installation; buoy, isolated danger; buoy, safe water; buoy, special purpose/general; mooring/warping facility.

19.3   Isolated danger buoys

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). 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).	

S-101 Geo Feature: Buoy isolated danger (BOYISD)

Primitives: Point

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Buoy shape	(BOYSHP)	1 : conical (nun, ogival) 2 : can (cylindrical) 3 : spherical 4 : pillar 5 : spar (spindle) 6 : barrel (tun) 7 : superbuoy 8 : ice buoy	EN	1,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Marks navigational – system of	(MARSYS)	1 : IALA A 2 : IALA B	EN	0,1

		9 : no system 10 : other system 11 : CEVNI		
Nature of construction	(NATCON)	6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted 10 : latticed	EN	0,*
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 12 : illuminated 18 : existence doubtful	EN	0,*
Topmark	(**TOPMAR**)		C	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	(S) EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	(S) EN	0,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Topmark/daymark shape	(TOPSHP)	1 : cone, point up 2 : cone, point down 3 : sphere 4 : 2 spheres 5 : cylinder (can) 6 : board 7 : x-shape (St. Andrew's cross) 8 : upright cross (St George's cross) 9 : cube, point up 10 : 2 cones, point to point 11 : 2 cones, base to base 12 : rhombus (diamond) 13 : 2 cones (points upward) 14 : 2 cones (points downward)	(S) EN	1,1

		15 : besom, point up (broom or perch) 16 : besom, point down (broom or perch) 17 : flag 18 : sphere over rhombus 19 : square 20 : rectangle, horizontal 21 : rectangle, vertical 22 : trapezium, up 23 : trapezium, down 24 : triangle, point up 25 : triangle, point down 26 : circle 27 : two upright crosses (one over the other) 27 : two upright crosses (one over the other) 28 : T-shape 29 : triangle pointing up over a circle 30 : upright cross over a circle 31 : rhombus over a circle 32 : circle over a triangle pointing up 33 : other shape (see INFORM)		
Information			(S) C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Vertical length	(VERLEN)		RE	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: Q 130.4

19.3.1   Isolated danger buoys (see S-4 – B-461.3 and B-467)

Isolated danger buoys are moored above isolated dangers of limited extent with navigable water all around them.

The shape of isolated danger buoys is not significant (although they are usually pillar or spar shaped). To conform to the IALA Maritime Buoyage System (see clause X.X), the body is black, with one or more red

bands. Black double-sphere topmarks are an important feature of isolated danger buoys and carried wherever practicable. The light (if fitted) is white Fl(2).

If it is required to encode a buoy having the function of an isolated danger mark, it must be done using the feature **Buoy Isolated Danger**.

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REGIONS A AND B
ISOLATED DANGER MARKS

Topmarks are always fitted (when practicable).

Light, when fitted, is white Group Flashing (2)

Fl (2)

Shape: Optional, but not conflicting with lateral marks; pillar or spar preferred.

Remarks:

* The attribute **colour pattern** must be populated if more than one value is populated for the mandatory attribute **colour**.
* For the complex attribute **topmark**, the sub-attribute **colour pattern** must be populated if more than one value is populated for the mandatory sub-attribute **colour**.
* If it is required to encode the total vertical length, including the topmark and any equipment features (e.g. light), of the buoy above the water level, it must be done using the attribute **vertical length**.

Distinction: Buoy, cardinal; buoy, emergency wreck marking; buoy, installation; buoy, lateral; buoy, safe water; buoy, special purpose/general; mooring/warping facility.

19.4   Lateral beacons

IHO Definition: **BEACON LATERAL**.   A beacon is a prominent specially constructed object forming a conspicuous mark as a fixed aid to navigation or for use in hydrographic survey. (IHO Dictionary – S-32).

A lateral beacon is used to indicate the port or starboard hand side of the route to be followed. They are generally used for well defined channels and are used in conjunction with a conventional direction of buoyage. (UKHO NP 735, 5th Edition).

S-101 Geo Feature: Beacon lateral (BCNLAT)

Primitives: Point

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Beacon shape	(BCNSHP)	1 : stake, pole, perch, post 2 : withy 3 : beacon tower 4 : lattice beacon 5 : pile beacon 6 : cairn 7 : buoyant beacon	EN	1,1
Category of lateral mark	(CATLAM)	1 : port-hand lateral mark 2 : starboard-hand lateral mark 3 : preferred channel to starboard lateral mark 4 : preferred channel to port lateral mark	EN	1,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Elevation	(ELEVAT)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name	(S) EN	0,1

		~~5 : display name~~		
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Height	(HEIGHT)		RE	0,1
Marks navigational – system of	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 10 : other system 11 : CEVNI	EN	0,1
Nature of construction	(NATCON)	1 : masonry 2 : concreted 6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted 10 : latticed	EN	0,*
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 12 : illuminated 18 : existence doubtful	EN	0,*
Topmark	(**TOPMAR**)		C	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	(S) EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	(S) EN	0,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1

Topmark/daymark shape	(TOPSHP)	1 : cone, point up 2 : cone, point down 3 : sphere 4 : 2 spheres 5 : cylinder (can) 6 : board 7 : x-shape (St. Andrew's cross) 8 : upright cross (St George's cross) 9 : cube, point up 10 : 2 cones, point to point 11 : 2 cones, base to base 12 : rhombus (diamond) 13 : 2 cones (points upward) 14 : 2 cones (points downward) 15 : besom, point up (broom or perch) 16 : besom, point down (broom or perch) 17 : flag 18 : sphere over rhombus 19 : square 20 : rectangle, horizontal 21 : rectangle, vertical 22 : trapezium, up 23 : trapezium, down 24 : triangle, point up 25 : triangle, point down 26 : circle 27 : two upright crosses (one over the other) 27 : two upright crosses (one over the other) 28 : T-shape 29 : triangle pointing up over a circle 30 : upright cross over a circle 31 : rhombus over a circle 32 : circle over a triangle pointing up 33 : other shape (see INFORM)	(S) EN	1,1
Information			(S) C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1

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

INT 1 Reference: Q 91-92, 130.1

19.4.1   Lateral Beacons (see S-4 – B-461.3 and B-467)
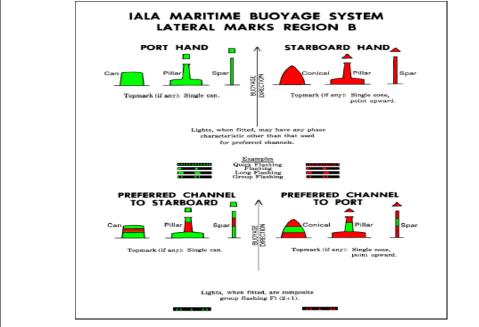
Lateral beacons are generally used for well defined channels, in conjunction with a direction of buoyage. They indicate the port and starboard sides of the route to be followed.

To conform to the IALA Maritime Buoyage System (see clause X.X), port hand beacons have a can shaped topmark. The colour of port hand beacons, topmarks and lights (if fitted) will be red in IALA region A and green in IALA region B.

To conform to the IALA Maritime Buoyage System, starboard hand beacons have a conical shaped topmark. The colour of starboard hand beacons, topmarks and lights (if fitted) will be green in IALA region A and red in IALA region B.

A preferred channel beacon is a modified lateral beacon, with horizontal colour bands. The predominant colour indicates which side is the preferred channel, the other colour indicates the secondary channel. If fitted, the light is Fl(2+1), the colour indicating the preferred channel.

If it is required to encode a beacon having the function of a lateral mark, it must be done using the feature **Beacon Lateral**.

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LATERAL MARKS REGION B

Remarks:
- The attribute **colour pattern** must be populated if more than one value is populated for the mandatory attribute **colour**.
- For the complex attribute **topmark**, the sub-attribute **colour pattern** must be populated if more than one value is populated for the mandatory sub-attribute **colour**.
- If it is required to encode the altitude of the ground level above the vertical datum at the position of a beacon, it must be done using the attribute **elevation**, but only for beacons built on land.
- If it is required to encode the total altitude of a beacon, including the topmark and any equipment features

(e.g. light), above the vertical datum, it must be done using the attribute **height**.
- If it is required to encode the total vertical length of a beacon, including the topmark and any equipment features (e.g. light), above the seabed or ground, it must be done using the attribute **vertical length**.
- If it is required to encode a cairn that bears the colour(s) specified by a navigational system of marks, it must be done using a beacon feature.

Distinction: Beacon, cardinal; beacon, isolated danger; beacon, safe water; beacon, special purpose/general; daymark.

19.5   Special purpose/general beacons

IHO Definition: **BEACON SPECIAL PURPOSE/GENERAL**. A beacon is a prominent specially constructed object forming a conspicuous mark as a fixed aid to navigation or for use in hydrographic survey. (IHO Dictionary – S-32).

A special purpose beacon is primarily used to indicate an area or feature, the nature of which is apparent from reference to a chart, Sailing Directions or Notices to Mariners. (UKHO NP 735, 5th Edition).

Beacon in general: A buoy whose appearance or purpose is not adequately known. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.12, November 2000).

S-101 Geo Feature: Beacon Special Purpose/General (BCNSPP)

Primitives: Point

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Beacon shape	(BCNSHP)	1 : stake, pole, perch, post 2 : withy 3 : beacon tower 4 : lattice beacon 5 : pile beacon 6 : cairn 7 : buoyant beacon	EN	1,1
Category of special purpose mark	(CATSPM)	1 : firing danger area mark 2 : target mark 3 : marker ship mark 4 : degaussing range mark 5 : barge mark 6 : cable mark 7 : spoil ground mark 8 : outfall mark 9 : ODAS (Ocean-Data Acquisition System) 10 : recording mark 11 : seaplane anchorage mark 12 : recreation zone mark 14 : mooring mark 15 : LANBY (Large Automatic Navigational Buoy) 16 : leading mark 17 : measured distance mark 18 : notice mark 19 : TSS mark (Traffic Separation Scheme) 20 : anchoring prohibited mark 21 : berthing prohibited mark 22 : overtaking prohibited mark 23 : two-way traffic prohibited mark 24 : reduced wake mark 25 : speed limit mark 26 : stop mark 27 : general warning mark 28 : sound ship's siren mark 29 : restricted vertical	EN	1,*

Comment [j124]: MD8 – 7.Co.10.

		clearance mark 30 : maximum vessel's draught mark 31 : restricted horizontal clearance mark 32 : strong current warning mark 33 : berthing permitted mark 34 : overhead power cable mark 35 : channel edge gradient' mark 36 : telephone mark 37 : ferry crossing mark 39 : pipeline mark 40 : anchorage mark 41 : clearing mark 42 : control mark 43 : diving mark 44 : refuge beacon 45 : foul ground mark 46 : yachting mark 47 : heliport mark 48 : GNSS mark 49 : seaplane landing mark 50 : control mark 51 : work in progress mark 52 : mark with unknown purpose 53 : wellhead mark 54 : channel separation mark 55 : marine farm mark 56 : artificial reef mark 57 : ice mark 58 : nature reserve mark		
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Elevation	(ELEVAT)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1

Comment [j125]: S-57 Extension 06/01.

Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Height	(HEIGHT)		RE	0,1
Marks navigational – system of	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 10 : other system 11 : CEVNI	EN	0,1
Nature of construction	(NATCON)	1 : masonry 2 : concreted 6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted 10 : latticed	EN	0,*
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 12 : illuminated 18 : existence doubtful	EN	0,*
Topmark	(TOPMAR)		C	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	(S) EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	(S) EN	0,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Topmark/daymark shape	(TOPSHP)	1 : cone, point up	(S) EN	1,1

		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)		
Information			(S) C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*

INT 1 Reference: Q 130.6

19.5.1 Special purpose/general beacons (see S-4 – B-461.3 and B-467)

Special beacons are used to indicate to the mariner a special area or feature, the nature of which is usually apparent from the chart or associated publication.

To conform to the IALA Maritime Buoyage System (see clause X.X), the body of the beacon is yellow. The topmark (if fitted) is a yellow diagonal 'X' (St Andrew's cross). Lights (if fitted) are yellow and of any rhythm except those used for cardinal, isolated danger and safe water marks.

If it is required to encode a beacon having the function of a special purpose mark, or a beacon whose appearance or purpose is inadequately known, it must be done using the feature **Beacon Special Purpose/General**.

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

Feature	INT1	Feature	beacon shape	category of special purpose mark	Other attributes
Minor not permanent mark	Q90	Beacon ***	1		
	Q91	Beacon Lateral	1	/	
	Q92	Beacon Lateral	2	/	
Cairn	Q100	Beacon ***	6		
Coloured or white mark	Q101	Daymark	/		nature of construction = 9
Coloured topmark with function of beacon	Q102.1	Daymark	/		nature of construction = 9
Painted board with function of leading beacon	Q102.2	Daymark	/	16	nature of construction = 9, topmark shape = 6
Beacon tower	Q110	Beacon ***	3		
Lattice beacon	Q111	Beacon ***	4		
Leading beacon	Q120	Beacon Special Purpose/General		16	
Beacon marking a clearing line	Q121	Beacon Special Purpose/General		41	
Beacon marking measured distance	Q122	Beacon Special Purpose/General		17	
Cable landing beacon	Q123	Beacon Special Purpose/General		6	
Outfall landing beacon	Q123	Beacon Special Purpose/General		8	
Pipeline landing beacon	Q123	Beacon Special Purpose/General		39	
Refuge beacon	Q124	Beacon Special Purpose/General		44	
Firing practice area beacon	Q125	Beacon Special Purpose/General		1	
Notice board	Q126	Beacon Special Purpose/General		18	

| Buoyant beacon | P5 | **Beacon Special Purpose/General** | *7* | | |

Remarks:
- The attribute **colour pattern** must be populated if more than one value is populated for the mandatory attribute **colour**.
- For the complex attribute **topmark**, the sub-attribute **colour pattern** must be populated if more than one value is populated for the mandatory sub-attribute **colour**.
- If it is required to encode the altitude of the ground level above the vertical datum at the position of a beacon, it must be done using the attribute **elevation**, but only for beacons built on land.
- If it is required to encode the total altitude of a beacon, including the topmark and any equipment features (e.g. light), above the vertical datum, it must be done using the attribute **height**.
- If it is required to encode the total vertical length of a beacon, including the topmark and any equipment features (e.g. light), above the seabed or ground, it must be done using the attribute **vertical length**.
- If it is required to encode a cairn that bears the colour(s) specified by a navigational system of marks, it must be done using a beacon feature.

19.5.2 Signs and notice boards

If it is required to encode a fixed or floating sign or notice board, it must be done using a **Beacon Special Purpose/General** feature or **Buoy Special Purpose/General** feature (see clause X.X), with attribute **category of special purpose mark** = *18* (notice mark), or using the feature **Daymark** (see clause X.X).

Remarks:
- If it is required to encode a sign or notice board that has more than one colour, the attributes **colour** and **colour pattern** must be used, according to the rules laid out in clause X.X.
- If it is required to encode any text shown on a notice board or sign, it must be done using the complex attribute **information**.
- If it is required to encode the shape and colour of a notice board, it must be done by encoding the board as a **Daymark** feature.

Distinction: Beacon, cardinal; beacon, isolated danger; beacon, lateral; beacon, safe water; daymark.

19.6 Special purpose/general buoys

IHO Definition: **BUOY, SPECIAL PURPOSE/GENERAL**. A buoy is a floating object moored to the bottom in a particular place, as an aid to navigation or for other specific purposes. (IHO Dictionary – S-32).	

A special purpose buoy is primarily used to indicate an area or feature, the nature of which is apparent from reference to a chart, Sailing Directions or Notices to Mariners. (UKHO NP 735, 5th Edition).

Buoy in general: A buoy whose appearance or purpose is not adequately known. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.24, November 2000).

S-101 Geo Feature: Buoy special purpose/general (BOYSPP)

Primitives: Point

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Buoy shape	(BOYSHP)	1 : conical (nun, ogival) 2 : can (cylindrical) 3 : spherical 4 : pillar 5 : spar (spindle) 6 : barrel (tun) 7 : superbuoy 8 : ice buoy	EN	1,1
Category of special purpose mark	(CATSPM)	1 : firing danger area mark 2 : target mark 3 : marker ship mark 4 : degaussing range mark 5 : barge mark 6 : cable mark 7 : spoil ground mark 8 : outfall mark 9 : ODAS (Ocean Data Acquisition System) 10 : recording mark 11 : seaplane anchorage mark 12 : recreation zone mark 14 : mooring mark 15 : LANBY (Large Automatic Navigational Buoy) 16 : leading mark 17 : measured distance mark 18 : notice mark 19 : TSS mark (Traffic Separation Scheme) 20 : anchoring prohibited mark 21 : berthing prohibited mark 22 : overtaking prohibited mark 23 : two-way traffic prohibited mark 24 : reduced wake mark 25 : speed limit mark 26 : stop mark 27 : general warning mark 28 : sound ship's siren mark 29 : restricted vertical	EN	1,*

Comment [j126]: MD8 – 7.Co.10.

		clearance mark 30 : maximum vessel's draught mark 31 : restricted horizontal clearance mark 32 : strong current warning mark 33 : berthing permitted mark 34 : overhead power cable mark 35 : channel edge gradient' mark 36 : telephone mark 37 : ferry crossing mark 39 : pipeline mark 40 : anchorage mark 41 : clearing mark 42 : control mark 43 : diving mark 44 : refuge beacon 45 : foul ground mark 46 : yachting mark 47 : heliport mark 48 : GNSS mark 49 : seaplane landing mark 50 : control mark 51 : work in progress mark 52 : mark with unknown purpose 53 : wellhead mark 54 : channel separation mark 55 : marine farm mark 56 : artificial reef mark 57 : ice mark 58 : nature reserve mark		
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1

Comment [j127]: S-57 Extension 06/01.

Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Marks navigational – system of	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 10 : other system 11 : CEVNI	EN	0,1
Nature of construction	(NATCON)	6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted 10 : latticed	EN	0,*
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 5 : periodic/intermittent 7 : temporary 8 : private 18 : existence doubtful	EN	0,*
Topmark	(**TOPMAR**)		C	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	(S) EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	(S) EN	0,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Topmark/daymark shape	(TOPSHP)	1 : cone, point up 2 : cone, point down 3 : sphere 4 : 2 spheres 5 : cylinder (can) 6 : board 7 : x-shape (St. Andrew's cross) 8 : upright cross (St George's cross) 9 : cube, point up 10 : 2 cones, point to point	(S) EN	1,1

		11 : 2 cones, base to base 12 : rhombus (diamond) 13 : 2 cones (points upward) 14 : 2 cones (points downward) 15 : besom, point up (broom or perch) 16 : besom, point down (broom or perch) 17 : flag 18 : sphere over rhombus 19 : square 20 : rectangle, horizontal 21 : rectangle, vertical 22 : trapezium, up 23 : trapezium, down 24 : triangle, point up 25 : triangle, point down 26 : circle 27 : two upright crosses (one over the other) 27 : two upright crosses (one over the other) 28 : T-shape 29 : triangle pointing up over a circle 30 : upright cross over a circle 31 : rhombus over a circle 32 : circle over a triangle pointing up 33 : other shape (see INFORM)		
Information			(S) C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Vertical length	(VERLEN)		RE	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: Q 50-62, 130.6

19.6.1 Special purpose/general buoys (see S-4 – B-461.3 and B-467)

> **Comment [j128]:** S-57 Extension 06/01.

Special marks are used to indicate to the mariner a special area or feature, the nature of which is usually apparent from the ENC, paper chart or associated publication. Special marks may also be used to mark a channel within a channel (e.g. a Deep Water route), using yellow buoys of the appropriate lateral shape, or yellow spherical buoys to mark the centreline. A special buoy may be any shape but must not conflict with lateral or safe water marks (e.g. an outfall buoy on the port-side of a channel could be can but should not be conical).

To conform to the IALA Maritime Buoyage System (see clause X.X), the body of the buoy is yellow. The topmark (if fitted) is a yellow diagonal 'X' (St Andrew's cross). Lights (if fitted) are yellow and of any rhythm except those used for cardinal, isolated danger and safe water marks.

If it is required to encode a buoy having the function of a special purpose mark, or a buoy whose appearance or purpose is inadequately known, it must be done using the feature **Buoy Special Purpose/General**.

In the following table, a blank indicates that the encoder may choose a relevant value for the attribute. The table contains the most common examples of coding; other coding combinations are possible for **Buoy Special Purpose/General** features.

Feature	INT1	Feature	buoy shape	category of special purpose mark	Other attributes
Firing danger area buoy	IQ50	**Bouy Special Purpose/General**		*1*	
Target	IQ51	**Bouy Special Purpose/General**		*2*	
Marker ship	IQ52	**Bouy Special Purpose/General**		*3*	
Barge	IQ53	**Bouy Special Purpose/General**		*5*	
Degaussing range buoy	IQ54	**Bouy Special Purpose/General**		*4*	
Buoy marking cable	IQ55	**Bouy Special Purpose/General**		*6*	
Spoil ground buoy	IQ56	**Bouy Special Purpose/General**		*7*	
Buoy marking outfall	IQ57	**Bouy Special Purpose/General**		*8*	
Buoy marking pipeline		**Bouy Special Purpose/General**		*39*	
Emergency wreck marking buoy		**Bouy Special Purpose/General**	*4* or *5*	*27*	**colour** = *5,6* **colour pattern** = *2*
Superbuoy	IQ26	**Buoy *****	*7*		
Large automatic navigational buoy	IP6	**Bouy Special Purpose/General**	*7*	*15*	
Data-collecting buoy of superbuoy size	IQ58	**Bouy Special Purpose/General**	*7*	*9*	
Buoy marking wave recorder (or current meter)	IQ59	**Bouy Special Purpose/General**		*10*	**information** = *wave recorder* (e.g.)
Seaplane anchorage buoy	IQ60	**Bouy Special Purpose/General**		*11*	
Buoy marking traffic separation scheme	IQ61	**Bouy Special Purpose/General**		*19*	
Buoy marking recreation zone	IQ62	**Bouy Special Purpose/General**		*12*	
Floating waste bin		**Bouy Special Purpose/General**		*Empty (null) value*	**information** = *waste bin* (e.g.)
Ocean Data Acquisition System (ODAS) buoy		**Obstruction**	*/*	*/*	**value of sounding** = depth of subsurface buoy (under water ODAS only)

				water level effect = 3 information = ODAS
Floating Fish Aggregating Device (FAD)		Obstruction	/	/	

Remarks:
- The attribute **colour pattern** must be populated if more than one value is populated for the mandatory attribute **colour**.
- For the complex attribute **topmark**, the sub-attribute **colour pattern** must be populated if more than one value is populated for the mandatory sub-attribute **colour**.
- If it is required to encode the total vertical length, including the topmark and any equipment features (e.g. light), of the buoy above the water level, it must be done using the attribute **vertical length**.
- Fish Aggregating Devices (FAD) and Ocean Data Acquisition System (ODAS) equipment, whether under water or floating, must be encoded, where required, using an **Obstruction** feature (see clause X.X).

Distinction: Buoy, cardinal; buoy, emergency wreck marking; buoy, installation; buoy, isolated danger; buoy, lateral; buoy, safe water; mooring/warping facility.

19.7   Safe water buoys

<u>IHO Definition:</u> **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).
A safe water buoy is used to indicate that there is navigable water around the mark. (UKHO NP 735, 5th Edition).

<u>S-101 Geo Feature:</u> Buoy safe water (BOYSAW)

<u>Primitives:</u> Point

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Buoy shape	(BOYSHP)	1 : conical (nun, ogival) 2 : can (cylindrical) 3 : spherical 4 : pillar 5 : spar (spindle) 6 : barrel (tun) 7 : superbuoy 8 : ice buoy	EN	1,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Marks navigational – system of	(MARSYS)	1 : IALA A 2 : IALA B	EN	0,1

		9 : no system 10 : other system 11 : CEVNI		
Nature of construction	(NATCON)	6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted 10 : latticed	EN	0,*
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 5 : periodic/intermittent 7 : temporary 8 : private 18 : existence doubtful	EN	0,*
Topmark	(**TOPMAR**)		C	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	(S) EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	(S) EN	0,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Topmark/daymark shape	(TOPSHP)	1 : cone, point up 2 : cone, point down 3 : sphere 4 : 2 spheres 5 : cylinder (can) 6 : board 7 : x-shape (St. Andrew's cross) 8 : upright cross (St George's cross) 9 : cube, point up 10 : 2 cones, point to point 11 : 2 cones, base to base 12 : rhombus (diamond) 13 : 2 cones (points upward) 14 : 2 cones (points downward) 15 : besom, point up (broom or perch)	(S) EN	1,1

		16 : besom, point down (broom or perch) 17 : flag 18 : sphere over rhombus 19 : square 20 : rectangle, horizontal 21 : rectangle, vertical 22 : trapezium, up 23 : trapezium, down 24 : triangle, point up 25 : triangle, point down 26 : circle 27 : two upright crosses (one over the other) 27 : two upright crosses (one over the other) 28 : T-shape 29 : triangle pointing up over a circle 30 : upright cross over a circle 31 : rhombus over a circle 32 : circle over a triangle pointing up 33 : other shape (see INFORM)		
Information			(S) C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Vertical length	(VERLEN)		RE	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: Q 130.5

19.7.1 Safe water buoys (see S-4 – B-461.3 and B-467)

Safe water marks are used to indicate there is safe water all around the mark. It may be used as a centre-line, mid-channel or landfall buoy, or to mark the best point of passage under a bridge.

To conform to the IALA Maritime Buoyage System (see clause X.X), the shape of a safe water buoy is spherical, pillar or spar. The body of the mark has red and white vertical stripes. A red spherical topmark is an important feature if the buoy is not spherical and carried wherever practicable. The light (if fitted) is white Oc, Iso, LFl or Mo(A) with a period of 10s.

If it is required to encode a buoy having the function of a safe water mark, it must be done using the feature **Buoy Safe Water**.

SAFE WATER MARKS

Topmark (if any):
Single sphere.

Shape: Spherical
or
pillar or spar.

Light, when fitted,
is **white**
Isophase or Occulting,
or one Long Flash
every 10 seconds or
Morse "A"

Iso
Occ
L Fl 10s
Morse "A"

Remarks:
- The attribute **colour pattern** must be populated if more than one value is populated for the mandatory attribute **colour**.
- For the complex attribute **topmark**, the sub-attribute **colour pattern** must be populated if more than one value is populated for the mandatory sub-attribute **colour**.
- If it is required to encode the total vertical length, including the topmark and any equipment features (e.g. light), of the buoy above the water level, it must be done using the attribute **vertical length**.

Distinction: Buoy, cardinal; buoy, emergency wreck marking; buoy, installation; buoy, isolated danger; buoy, lateral; buoy, special purpose/general; mooring/warping facility.

19.8   Cardinal buoys

IHO Definition: **BUOY, CARDINAL**. A buoy is a floating object moored to the bottom in a particular place, as an aid to navigation or for other specific purposes. (IHO Dictionary – S-32).
A cardinal buoy is used in conjunction with the compass to indicate where the mariner may find the best navigable water. It is placed in one of the four quadrants (North, East, South and West), bounded by inter-cardinal bearings from the point marked. (UKHO NP 735, 5th Edition).

S-101 Geo Feature: Buoy cardinal (BOYCAR)

Primitives: Point

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Buoy shape	(BOYSHP)	1 : conical (nun, ogival) 2 : can (cylindrical) 3 : spherical 4 : pillar 5 : spar (spindle) 6 : barrel (tun) 7 : superbuoy 8 : ice buoy	EN	1,1
Category of cardinal mark	(CATCAM)	1 : north cardinal mark 2 : east cardinal mark 3 : south cardinal mark 4 : west cardinal mark	EN	1,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1

Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Marks navigational – system of	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 10 : other system 11 : CEVNI	EN	0,1
Nature of construction	(NATCON)	6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted 10 : latticed	EN	0,*
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 5 : periodic/intermittent 7 : temporary 8 : private 18 : existence doubtful	EN	0,*
Topmark	(TOPMAR)		C	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	(S) EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	(S) EN	0,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Topmark/daymark shape	(TOPSHP)	1 : cone, point up 2 : cone, point down 3 : sphere 4 : 2 spheres 5 : cylinder (can) 6 : board 7 : x-shape (St. Andrew's cross) 8 : upright cross (St George's cross) 9 : cube, point up 10 : 2 cones, point to point 11 : 2 cones, base to base 12 : rhombus (diamond)	(S) EN	1,1

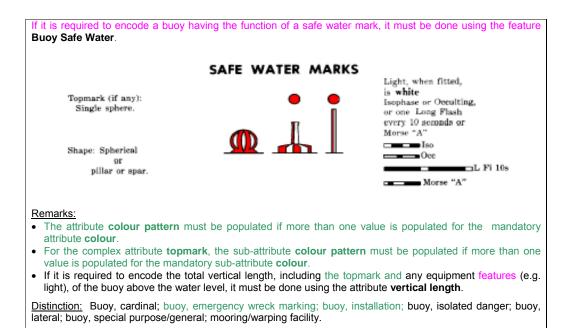|				
		13 : 2 cones (points upward) 14 : 2 cones (points downward) 15 : besom, point up (broom or perch) 16 : besom, point down (broom or perch) 17 : flag 18 : sphere over rhombus 19 : square 20 : rectangle, horizontal 21 : rectangle, vertical 22 : trapezium, up 23 : trapezium, down 24 : triangle, point 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)		
Information			(S) C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Vertical length	(VERLEN)		RE	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: Q 130.3

19.8.1 Cardinal buoys (see S-4 – B-461.3 and B-467)

Cardinal marks are used in conjunction with the compass to indicate where a mariner may find best navigable water, taking their name from the quadrant in which they are placed in relation to the point marked. The

mariner should pass N of a North mark, E of an East mark, etc. The shape of cardinal buoys is not significant (although they are usually pillar or spar).

To conform to the IALA Maritime Buoyage System (see clause X.X), the body has black and yellow bands, configured with black reflecting the points of the topmark cones (e.g. black above yellow for north). Black double-cone topmarks are an important feature of cardinal marks and are carried wherever practicable. The points are up for a north mark, down for a south mark, apart for an east mark and together for a west mark. Lights (if fitted) are white Q or VQ, uninterrupted for the north, 3 flashes for east, 6 flashes + LFI for south and 9 flashes for west (resembling an analogue clock).

If it is required to encode a buoy having the function of a cardinal mark, it must be done using the feature **Buoy Cardinal**.

IALA MARITIME BUOYAGE SYSTEM
CARDINAL MARKS REGIONS A AND B

Topmarks are always fitted (when practicable).
Buoy shapes are pillar or spar.

Lights, when fitted, are **white** . Very Quick Flashing
or Quick Flashing; a South mark also has a
Long Flash immediately following the quick flashes.

Remarks:
- The attribute **colour pattern** must be populated if more than one value is populated for the mandatory attribute **colour**.
- For the complex attribute **topmark**, the sub-attribute **colour pattern** must be populated if more than one value is populated for the mandatory sub-attribute **colour**.
- If it is required to encode the total vertical length, including the topmark and any equipment features (e.g. light), of the buoy above the water level, it must be done using the attribute **vertical length**.

Distinction: Buoy, emergency wreck marking; buoy, installation; buoy, isolated danger; buoy, lateral; buoy, safe water; buoy, special purpose/general; mooring/warping facility.

19.9 Topmarks

IHO Definition: **TOPMARK**. A characteristic shape secured at the top of a buoy or beacon to aid in its identification. (IHO Dictionary – S-32).
S-101 Geo Feature: Topmark (TOPMAR)
Primitives: Point

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Status	(STATUS)	1 : permanent 5 : periodic/intermittent 7 : temporary 8 : private 12 : illuminated 14 : public	EN	0,*
Topmark shape	(TOPSHP)	1 : cone, point up 2 : cone, point down 3 : sphere 4 : 2 spheres 5 : cylinder (can) 6 : board 7 : x-shape (St. Andrew's cross) 8 : upright cross (St George's cross) 9 : cube, point up 10 : 2 cones, point to point 11 : 2 cones, base to base 12 : rhombus (diamond)	EN	1,1

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

INT 1 Reference: Q 9

19.9.1   Topmarks   (see S-4 – B-463 and B-467)

Many different topmarks are used on buoys and on beacons but in the IALA Maritime Buoyage System the variations are reduced to a few important shapes: can, conical, spherical, X-shaped and upright (cruciform).

Leading topmarks are often added to leading beacons, which are usually constructed in pairs and provide a lead to be followed. There is currently no guidance on the standard shapes or colours of topmarks for leading marks. However, leading topmarks are commonly triangular shaped structures pointing upwards (front) and downwards (rear), but other shapes may be used.

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

Remarks:
- For usage of topmarks in the IALA Maritime Buoyage System, see features related to fixed and floating aids to navigation in Section X.

Distinction: Beacon, cardinal; beacon, isolated danger; beacon, lateral; beacon, safe water; beacon, special purpose/general; buoy, cardinal; buoy, emergency wreck marking; buoy, installation; buoy, isolated danger; buoy, lateral; buoy, safe water; buoy, special purpose/general; daymark.

19.10 Retroreflectors

IHO Definition: **RETROREFLECTOR**. A means of distinguishing unlighted marks at night. Retroreflective material is secured to the mark in a particular pattern to reflect back light. (UKHO NP 735, 5th Edition).

S-101 Geo Feature: Retroreflector (RETRFL)

Primitives: Point

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	0,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Height	(HEIGHT)		RE	0,1
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Status	(STATUS)	1 : permanent 4 : not in use 8 : private	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
~~Recording date~~	~~(RECDAT)~~	~~ISO 8601:1988~~	~~DA~~	~~0,1~~
~~Recording indication~~	~~(RECIND)~~		~~TE~~	~~0,1~~

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

INT 1 Reference: Q 6

19.10.1 Retroreflectors (see S-4 – B-460.7)

Retroreflective material may be secured to unlit marks to aid their identification at night. The material is coloured according to one of two recognized IALA codes ("Standard" and "Comprehensive"). In any specified area only one of the codes will be used and this may be given in nautical publications.

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

Remarks:
- The complex attribute **information** is used to describe letters, patterns or numerals shown on the retroreflector.
- The body carrying the retroreflector is a separate feature.

Distinction: Beacon, cardinal; beacon, isolated danger; beacon, lateral; beacon, safe water; beacon, special purpose/general; buoy, cardinal; buoy, emergency wreck marking; buoy, installation; buoy, isolated danger; buoy, lateral; buoy, safe water; buoy, special purpose/general; 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).

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).

S-101 Geo Feature: Beacon cardinal (BCNCAR)

Primitives: Point

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Beacon shape	(BCNSHP)	1 : stake, pole, perch, post 2 : withy 3 : beacon tower 4 : lattice beacon 5 : pile beacon 6 : cairn 7 : buoyant beacon	EN	1,1
Category of cardinal mark	(CATCAM)	1 : north cardinal mark 2 : east cardinal mark 3 : south cardinal mark 4 : west cardinal mark	EN	1,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Elevation	(ELEVAT)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1

Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Height	(HEIGHT)		RE	0,1
Marks navigational – system of	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 10 : other system 11 : CEVNI	EN	0,1
Nature of construction	(NATCON)	1 : masonry 2 : concreted 6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted 10 : latticed	EN	0,*
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 12 : illuminated 18 : existence doubtful	EN	0,*
Topmark	(**TOPMAR**)		C	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	(S) EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	(S) EN	0,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Topmark/daymark shape	(TOPSHP)	1 : cone, point up 2 : cone, point down 3 : sphere	(S) EN	1,1

		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)		
Information			(S) C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1

INT 1 Reference: Q 130.3

19.11.1 Cardinal beacons (see S-4 – B-461.3 and B-467)

Cardinal marks are used in conjunction with the compass to indicate where a mariner may find best navigable water, taking their name from the quadrant in which they are placed in relation to the point marked. The mariner should pass N of a North mark, E of an East mark, etc.

To conform to the IALA Maritime Buoyage System (see clause X.X), the body of the beacon has black and yellow bands, configured with black reflecting the points of the topmark cones (e.g. black above yellow for north). Black double-cone topmarks are an important feature of cardinal marks and are carried wherever practicable. The points are up for a north mark, down for a south mark, apart for an east mark and together for a west mark. Lights (if fitted) are white Q or VQ, uninterrupted for the north, 3 flashes for east, 6 flashes + LFl for south and 9 flashes for west (resembling an analogue clock).

If it is required to encode a beacon having the function of a cardinal mark, it must be done using the feature **Beacon Cardinal**.

IALA MARITIME BUOYAGE SYSTEM
CARDINAL MARKS REGIONS A AND B

Remarks:
- The attribute **colour pattern** must be populated if more than one value is populated for the mandatory attribute **colour**.
- For the complex attribute **topmark**, the sub-attribute **colour pattern** must be populated if more than one value is populated for the mandatory sub-attribute **colour**.
- If it is required to encode the altitude of the ground level above the vertical datum at the position of a beacon, it must be done using the attribute **elevation**, but only for beacons built on land.
- If it is required to encode the total altitude of a beacon, including the topmark and any equipment features (e.g. light), above the vertical datum, it must be done using the attribute **height**.
- If it is required to encode the total vertical length of a beacon, including the topmark and any equipment features (e.g. light), above the seabed or ground, it must be done using the attribute **vertical length**.
- If it is required to encode a cairn that bears the colour(s) specified by a navigational system of marks, it must be done using a beacon feature.

Distinction: Beacon, isolated danger; beacon, lateral; beacon, safe water; beacon, special purpose/general; daymark.

19.12   Safe water beacons

IHO Definition: **BEACON**, **SAFE WATER**.   A safe water beacon is a prominent specially constructed object forming a conspicuous mark as a fixed aid to navigation or for use in hydrographic survey. (IHO Dictionary – S-32, Edition 5).

A safe water beacon is used to indicate that there is navigable water around the mark. (UKHO NP735, 5th Edition).

S-101 Geo Feature: Beacon safe water (BCNSAW)

Primitives: Point

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Beacon shape	(BCNSHP)	1 : stake, pole, perch, post 2 : withy 3 : beacon tower 4 : lattice beacon 5 : pile beacon 6 : cairn 7 : buoyant beacon	EN	1,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Elevation	(ELEVAT)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1

Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Height	(HEIGHT)		RE	0,1
Marks navigational – system of	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 10 : other system 11 : CEVNI	EN	0,1
Nature of construction	(NATCON)	1 : masonry 2 : concreted 6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted 10 : latticed	EN	0,*
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 12 : illuminated 18 : existence doubtful	EN	0,*
Topmark	(**TOPMAR**)		C	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	(S) EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	(S) EN	0,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Topmark/daymark shape	(TOPSHP)	1 : cone, point up 2 : cone, point down 3 : sphere 4 : 2 spheres 5 : cylinder (can) 6 : board 7 : x-shape (St. Andrew's cross)	(S) EN	1,1

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

Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: Q 130.5

19.12.1 Safe water beacons (see S-4 – B-461.3 and B-467)

Safe water marks are used to indicate there is safe water all around the mark. It may be used as a centre-line, mid-channel or landfall beacon, or to mark the best point of passage under a bridge.

To conform to the IALA Maritime Buoyage System (see clause X.X), the body of the mark has red and white vertical stripes. A red spherical topmark is an important feature if the beacon is not spherical and carried wherever practicable. The light (if fitted) is white Oc, Iso, LFI or Mo(A) with a period of 10s.

If it is required to encode a beacon having the function of a safe water mark, it must be done using the feature **Beacon Safe Water**.

Remarks:
- The attribute **colour pattern** must be populated if more than one value is populated for the mandatory attribute **colour**.
- For the complex attribute **topmark**, the sub-attribute **colour pattern** must be populated if more than one value is populated for the mandatory sub-attribute **colour**.
- If it is required to encode the altitude of the ground level above the vertical datum at the position of a beacon, it must be done using the attribute **elevation**, but only for beacons built on land.
- If it is required to encode the total altitude of a beacon, including the topmark and any equipment features (e.g. light), above the vertical datum, it must be done using the attribute **height**.
- If it is required to encode the total vertical length of a beacon, including the topmark and any equipment features (e.g. light), above the seabed or ground, it must be done using the attribute **vertical length**.
- If it is required to encode a cairn that bears the colour(s) specified by a navigational system of marks, it must be done using a beacon feature.

Distinction: Beacon, cardinal; beacon, isolated danger; beacon, lateral; beacon, special purpose/general; daymark.

19.13 Isolated danger beacons

IHO Definition: **BEACON, ISOLATED DANGER**. A beacon is a prominent, specially constructed object forming a conspicuous mark as a fixed aid to navigation or for use in hydrographic survey. (IHO Dictionary – S-32).
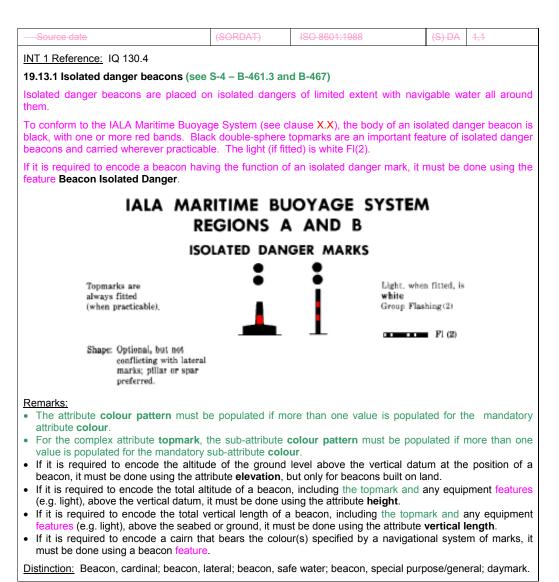
An isolated danger beacon is a beacon erected on an isolated danger of limited extent, which has navigable water all around it. (UKHO NP735, 5th Edition).

S-101 Geo Feature: Beacon isolated danger (BCNISD)

Primitives: Point

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Beacon shape	(BCNSHP)	1 : stake, pole, perch, post 2 : withy 3 : beacon tower 4 : lattice beacon 5 : pile beacon 6 : cairn 7 : buoyant beacon	EN	1,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Condition	(CONDTN)	1 : under construction 2 : ruined 5 : planned construction	EN	0,1
Elevation	(ELEVAT)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1

Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Height	(HEIGHT)		RE	0,1
Marks navigational – system of	(MARSYS)	1 : IALA A 2 : IALA B 9 : no system 10 : other system 11 : CEVNI	EN	0,1
Nature of construction	(NATCON)	1 : masonry 2 : concreted 6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted 10 : latticed	EN	0,*
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 12 : illuminated 18 : existence doubtful	EN	0,*
Topmark	(**TOPMAR**)		C	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	(S) EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	(S) EN	0,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Topmark/daymark shape	(TOPSHP)	1 : cone, point up 2 : cone, point down 3 : sphere 4 : 2 spheres 5 : cylinder (can) 6 : board 7 : x-shape (St. Andrew's cross)	(S) EN	1,1

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

~~Source date~~	~~(SORDAT)~~	~~ISO 8601:1988~~	~~(S) DA~~	~~1,1~~

INT 1 Reference: IQ 130.4

19.13.1 Isolated danger beacons (see S-4 – B-461.3 and B-467)

Isolated danger beacons are placed on isolated dangers of limited extent with navigable water all around them.

To conform to the IALA Maritime Buoyage System (see clause X.X), the body of an isolated danger beacon is black, with one or more red bands. Black double-sphere topmarks are an important feature of isolated danger beacons and carried wherever practicable. The light (if fitted) is white Fl(2).

If it is required to encode a beacon having the function of an isolated danger mark, it must be done using the feature **Beacon Isolated Danger**.

Remarks:
- The attribute **colour pattern** must be populated if more than one value is populated for the mandatory attribute **colour**.
- For the complex attribute **topmark**, the sub-attribute **colour pattern** must be populated if more than one value is populated for the mandatory sub-attribute **colour**.
- If it is required to encode the altitude of the ground level above the vertical datum at the position of a beacon, it must be done using the attribute **elevation**, but only for beacons built on land.
- If it is required to encode the total altitude of a beacon, including the topmark and any equipment features (e.g. light), above the vertical datum, it must be done using the attribute **height**.
- If it is required to encode the total vertical length of a beacon, including the topmark and any equipment features (e.g. light), above the seabed or ground, it must be done using the attribute **vertical length**.
- If it is required to encode a cairn that bears the colour(s) specified by a navigational system of marks, it must be done using a beacon feature.

Distinction: Beacon, cardinal; beacon, lateral; beacon, safe water; beacon, special purpose/general; daymark.

19.14 Installation buoys

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).
An installation buoy is a buoy used for loading tankers with gas or oil. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.20, November 2000).

S-101 Geo Feature: Buoy installation (BOYINB)

Primitives: Point

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Buoy shape	(BOYSHP)	1 : conical (nun, ogival) 2 : can (cylindrical) 3 : spherical 4 : pillar 5 : spar (spindle) 6 : barrel (tun) 7 : superbuoy 8 : ice buoy	EN	1,1
Category of installation buoy	(CATINB)	1 : catenary anchor leg mooring (CALM) 2 : single buoy mooring (SBM or SPM)	EN	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1

Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
~~Marks navigational – system of~~	~~(MARSYS)~~	~~1 : IALA A~~ ~~2 : IALA B~~ ~~9 : no system~~ ~~10 : other system~~ ~~11 : CEVNI~~	~~EN~~	~~0,1~~
Nature of construction	(NATCON)	6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted 10 : latticed	EN	0,*
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Product	(PRODCT)	1 : oil 2 : gas 18 : liquefied natural gas (LNG) 19 : liquefied petroleum gas (LPG)	EN	0,1
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 18 : existence doubtful	EN	0,*
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
~~Recording date~~	~~(RECDAT)~~	~~ISO 8601:1988~~	~~DA~~	~~0,1~~
~~Recording indication~~	~~(RECIND)~~		~~TE~~	~~0,1~~
~~Source indication~~			~~C~~	~~0,*~~
~~Authority~~			~~(S) TE~~	~~1,1~~
~~Nationality~~			~~(S) TE~~	~~1,1~~
~~ID code~~			~~(S) TE~~	~~0,1~~
~~Source~~			~~(S) TE~~	~~0,1~~
~~Source date~~	~~(SORDAT)~~	~~ISO 8601:1988~~	~~(S) DA~~	~~1,1~~

INT 1 Reference: L 16

19.14.1 Installation buoys (see S-4 – B-445.4)

Although the oil and gas from some fields are sent ashore by submarine pipeline, a variety of mooring systems have been developed for use in deep water and in the vicinity of certain ports, to allow the loading of large

vessels and the permanent mooring of floating storage vessels or units. These offshore systems include large mooring buoys, designed for mooring vessels up to 500,000 tonnes, and platforms on structures fixed at their lower ends to the sea floor. They allow a vessel to moor forward or aft to them, and to swing to the wind or stream, and are termed installation buoys.

If it is required to encode an installation buoy, it must be done using the feature **Buoy Installation**.

Remarks:
- The attribute **colour pattern** must be populated if more than one value is populated for the mandatory attribute **colour**.
- If it is required to encode the total vertical length, including any equipment features (e.g. light), of the buoy above the water level, it must be done using the attribute **vertical length**.

Distinction: Buoy, special purpose/general; mooring/warping facility; offshore platform.

19.15 Light floats

IHO Definition: **LIGHT FLOAT**. A boat-like structure used instead of a light buoy in waters where strong streams or currents are experienced, or when a greater elevation than that of a light buoy is necessary. (IHO Dictionary – S-32).

S-101 Geo Feature: Light float (LITFLT)

Primitives: Point

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Horizontal length	(HORLEN)		RE	0,1
Horizontal width	(HORWID)		RE	0,1
Nature of construction	(NATCON)	6 : wooden 7 : metal 9 : painted 10 : latticed	EN	0,*
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1

Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 14 : public 16 : watched 17 : un-watched	EN	0,*
Topmark	(TOPMAR)		C	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	(S) EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	(S) EN	0,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Topmark/daymark shape	(TOPSHP)	1 : cone, point up 2 : cone, point down 3 : sphere 4 : 2 spheres 5 : cylinder (can) 6 : board 7 : x-shape (St. Andrew's cross) 8 : upright cross (St George's cross) 9 : cube, point up 10 : 2 cones, point to point 11 : 2 cones, base to base 12 : rhombus (diamond) 13 : 2 cones (points upward) 14 : 2 cones (points downward) 15 : besom, point up (broom or perch) 16 : besom, point down (broom or perch) 17 : flag 18 : sphere over rhombus 19 : square 20 : rectangle, horizontal 21 : rectangle, vertical 22 : trapezium, up 23 : trapezium, down 24 : triangle, point up 25 : triangle, point down 26 : circle	(S) EN	1,1

		27 : two upright crosses (one over the other) 27 : two upright crosses (one over the other) 28 : T-shape 29 : triangle pointing up over a circle 30 : upright cross over a circle 31 : rhombus over a circle 32 : circle over a triangle pointing up 33 : other shape (see INFORM)		
Information			(S) C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
~~Recording date~~	~~(RECDAT)~~	~~ISO 8601:1988~~	~~DA~~	~~0,1~~
~~Recording indication~~	~~(RECIND)~~		~~TE~~	~~0,1~~
~~Source indication~~			~~C~~	~~0,*~~
~~Authority~~			~~(S) TE~~	~~1,1~~
~~Nationality~~			~~(S) TE~~	~~1,1~~
~~ID code~~			~~(S) TE~~	~~0,1~~
~~Source~~			~~(S) TE~~	~~0,1~~
~~Source date~~	~~(SORDAT)~~	~~ISO 8601:1988~~	~~(S) DA~~	~~1,1~~

INT 1 Reference: Q 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 **Light Float**.

Remarks:
- The light on a light float is a separate feature, handled as with buoys, beacons, etc.

Distinction: Buoy, cardinal; buoy, emergency wreck marking; buoy, installation; buoy, isolated danger; buoy, lateral; buoy, safe water; buoy, special purpose/general; light vessel.

19.16 Emergency wreck marking buoys

IHO Definition: **BUOY, EMERGENCY WRECK MARKING**. A buoy is a floating object moored to the bottom in a particular place, as an aid to navigation or for other specific purposes. (IHO Dictionary – S-32). An emergency wreck marking buoy is a buoy moored on or above a new wreck, designed to provide a prominent (both visual and radio) and easily identifiable temporary (24-72 hours) first response. (UKHO NP 735, 6th Edition).	

S-101 Geo Feature: Buoy emergency wreck marking

Primitives: Point

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Buoy shape	(BOYSHP)	1 : conical (nun, ogival) 2 : can (cylindrical) 3 : spherical 4 : pillar 5 : spar (spindle) 6 : barrel (tun) 7 : superbuoy 8 : ice buoy	EN	1,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Marks navigational – system of	(MARSYS)	1 : IALA A	EN	0,1

		2 : IALA B 9 : no system 10 : other system 11 : CEVNI		
Nature of construction	(NATCON)	6 : wooden 7 : metal 8 : glass reinforced plastic (GRP) 9 : painted 10 : latticed	EN	0,*
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 5 : periodic/intermittent 7 : temporary 8 : private 18 : existence doubtful	EN	0,*
Topmark	(**TOPMAR**)		C	0,1
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	(S) EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	(S) EN	0,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Topmark/daymark shape	(TOPSHP)	1 : cone, point up 2 : cone, point down 3 : sphere 4 : 2 spheres 5 : cylinder (can) 6 : board 7 : x-shape (St. Andrew's cross) 8 : upright cross (St George's cross) 9 : cube, point up 10 : 2 cones, point to point 11 : 2 cones, base to base 12 : rhombus (diamond) 13 : 2 cones (points upward) 14 : 2 cones (points downward) 15 : besom, point up (broom	(S) EN	1,1

		or perch) 16 : besom, point down (broom or perch) 17 : flag 18 : sphere over rhombus 19 : square 20 : rectangle, horizontal 21 : rectangle, vertical 22 : trapezium, up 23 : trapezium, down 24 : triangle, point up 25 : triangle, point down 26 : circle 27 : two upright crosses (one over the other) 27 : two upright crosses (one over the other) 28 : T-shape 29 : triangle pointing up over a circle 30 : upright cross over a circle 31 : rhombus over a circle 32 : circle over a triangle pointing up 33 : other shape (see INFORM)		
Information			(S) C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Vertical length	(VERLEN)		RE	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: ?????

19.16.1 Emergency wreck marking buoys (see S-4 – B-461.3 and B-467)

Emergency wreck marking buoys are used to mark new dangers until a permanent form of marking has been established and the danger itself has been promulgated by Notice to Mariners, or removed.

To conform to the IALA Maritime Buoyage System (see clause X.X), the shape of an emergency wreck marking buoy is pillar or spar. The body of the mark has blue and yellow vertical stripes. The topmark (if fitted) is a standing/upright yellow '+' (St. George's cross). Lights (if fitted) are Al.Oc.BuY.3s.

If it is required to encode a buoy having the function of an emergency wreck mark, it must be done using the feature **Buoy emergency wreck marking**.

[INSERT DIAGRAM]

Remarks:

- The attribute **colour pattern** must be populated if more than one value is populated for the mandatory attribute **colour**.
- For the complex attribute **topmark**, the sub-attribute **colour pattern** must be populated if more than one value is populated for the mandatory sub-attribute **colour**. The **topmark** complex attribute should be populated with sub-attributes **topmark shape** = *8* (upright cross (St George's cross)) and **colour** = *6* (yellow). An IALA compliant emergency wreck marking buoy topmar should be populated with sub-attributes **topmark shape** = *8* (upright cross (St George's cross)) and **colour** = *6* (yellow).
- If it is required to encode the total vertical length, including the topmark and any equipment features (e.g. light), of the buoy above the water level, it must be done using the attribute **vertical length**.
- An IALA compliant emergency wreck marking buoy should also have the following associated equipment features:
  - A **Light** feature (see clause X,.X), with attributes **colour** = *5,6* (blue, yellow), **light characteristic** = *17* (occulting alternating), **signal group** = *(1)* and **signal period** = *3*. The attribute **signal sequence** should be populated as *1.00+(0.50)+1.00+(0.50)* and the attribute **value of nominal range** should be populated as *4*.
  - A **Radar Transponder Beacon** feature (see clause X,.X), with attributes **category of radar transponder beacon** = *2* (racon, radar transponder beacon) and **signal group** = *(D)*.

Distinction: Buoy, cardinal; buoy, installation; buoy, lateral; buoy, safe water; buoy, special purpose/general; mooring/warping facility.

19.17 Light vessels

<table>
<tr><td colspan="6">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).</td></tr>
<tr><td colspan="6">**S-101 Geo Feature:** **Light vessel (LITVES)**</td></tr>
<tr><td colspan="6">**Primitives:** **Point**</td></tr>
<tr><td colspan="2">*Real World*</td><td colspan="2">*Paper Chart Symbol*</td><td colspan="2">*ECDIS Symbol*</td></tr>
<tr><td colspan="2"></td><td colspan="2"></td><td colspan="2"></td></tr>
</table>

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Colour	(COLOUR)	1 : white 2 : black 3 : red 4 : green 5 : blue 6 : yellow 7 : grey 8 : brown 9 : amber 10 : violet 11 : orange 12 : magenta 13 : pink	EN	1,*
Colour pattern	(COLPAT)	1 : horizontal stripes 2 : vertical stripes 3 : diagonal stripes 4 : squared 5 : stripes (direction unknown) 6 : border stripe	EN	0,1
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Horizontal length	(HORLEN)		RE	0,1
Horizontal width	(HORWID)		RE	0,1
Nature of construction	(NATCON)	6 : wooden 7 : metal 9 : painted	EN	0,*
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1

Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Radar conspicuous	(CONRAD)		BO	0,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 14 : public 16 : watched 17 : un-watched	EN	0,*
Vertical length	(VERLEN)		RE	0,1
Visually conspicuous	(CONVIS)		BO	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: P 6

19.17.1 Lights vessels (see S-4 – B-474.1-3)

Major floating lights are generally classed as those with a nominal range in excess of 10 nautical miles. Special circumstances, e.g. an isolated location, may mean that a floating light of lower range is given this status. The structure on which the light is fixed will be a light vessel, a major light float or a LANBY (Large Automatic Navigational Buoy, which is a type of superbuoy).

If it is required to encode a light vessel, it must be done using the feature **Light Vessel**.

Remarks:
- The attribute **colour pattern** must be populated if more than one value is populated for the mandatory attribute **colour**.

Distinction: Beacon, cardinal; beacon, isolated danger; beacon, lateral; beacon, safe water; beacon special purpose/general; buoy, cardinal; buoy, emergency wreck marking; buoy, installation; buoy, isolated danger; buoy, lateral; buoy, safe water; buoy, special purpose/general; light float.

19.18 Radar reflectors

IHO Definition: **RADAR REFLECTOR**. A device capable of, or intended for, reflecting radar signals. (IHO Dictionary – S-32).

A radar reflector is usually a "tetrahedron or pentagonal corner reflector (…) to facilitate reflection towards the sender". (International Maritime Dictionary, 2nd Ed.).

S-101 Geo Feature: Radar reflector (RADRFL)

Primitives: Point

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Height	(HEIGHT)		RE	0,1
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Status	(STATUS)	1 : permanent 4 : not in use 8 : private	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
~~Recording date~~	~~(RECDAT)~~	~~ISO 8601:1988~~	~~DA~~	~~0,1~~
~~Recording indication~~	~~(RECIND)~~		~~TE~~	~~0,1~~
~~Source indication~~			~~C~~	~~0,*~~
~~ Authority~~			~~(S) TE~~	~~1,1~~
~~ Nationality~~			~~(S) TE~~	~~1,1~~
~~ ID code~~			~~(S) TE~~	~~0,1~~
~~ Source~~			~~(S) TE~~	~~0,1~~
~~ Source date~~	~~(SORDAT)~~	~~ISO 8601:1988~~	~~(S) DA~~	~~1,1~~

INT 1 Reference: S 4

19.18.1 Radar reflectors (see S-4 – B-455.8 and B-465)

If it is required to encode radar reflectors on curve features (e.g. overhead cables), this must be done using the feature **Radar Reflector**.

Remarks:
- If it is required to encode a feature which has no radar reflector, but is radar conspicuous, it must be

indicated using attribute **radar conspicuous** on the feature.
- If it is required to encode an area or point feature which is radar conspicuous because it is fitted with a radar reflector, it must be indicated using **radar conspicuous** on the feature. A **Radar Reflector** feature must not be encoded in this case.

Distinction: Retro-reflector.

19.19 Fog signals

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).

S-101 Geo Feature: Fog signal (FOGSIG)

Primitives: Point

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of fog signal	(CATFOG)	1 : explosive 2 : diaphone 3 : siren 4 : nautophone 5 : reed 6 : tyfon 7 : bell 8 : whistle 9 : gong 10 : horn	EN	1,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Signal frequency	(SIGFRQ)		IN	0,1
Signal generation	(SIGGEN)	1 : automatically 2 : by wave action 3 : by hand 4 : by wind	EN	0,1
Signal group	(SIGGRP)		TE	0,1
Signal period	(SIGPER)		RE	0,1
Signal sequence			(S) C	0,* (ordered)
Signal duration			(S) RE	1,1
Signal status		1 : lit 2 : eclipsed	(S) EN	1,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use	EN	0,*

		5 : periodic/intermittent 7 : temporary 8 : private 15 : synchronized		
Value of maximum range	(VALMXR)		RE	0,1
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
~~Recording date~~	~~(RECDAT)~~	~~ISO 8601:1988~~	~~DA~~	~~0,1~~
~~Recording indication~~	~~(RECIND)~~		~~TE~~	~~0,1~~
~~Source indication~~			~~C~~	~~0,*~~
~~Authority~~			~~(S) TE~~	~~1,1~~
~~Nationality~~			~~(S) TE~~	~~1,1~~
~~ID code~~			~~(S) TE~~	~~0,1~~
~~Source~~			~~(S) TE~~	~~0,1~~
~~Source date~~	~~(SORDAT)~~	~~ISO 8601:1988~~	~~(S) DA~~	~~1,1~~

INT 1 Reference: R 1, 10-16, 20-22

19.19.1 Fog signals (see S-4 – B-451-454)

The term "fog signal" refers to the sound emitted, not the apparatus. Fog signals are short range aids to navigation, principally used as hazard warnings. For various reasons they are unreliable as indicators of position. Their importance relative to other aids to navigation has declined but they are still considered useful for the safe navigation of vessels with very limited (or non-functioning) electronic equipment. A fog signal should be shown on ENCs at an maximum display scale on which vessels may navigate within range.

The position from which a fog signal is emitted is usually on a buoy, or close enough to a light to be treated as sounded from the same position as the light.

If it is required to encode a fog signal, it must be done using the feature **Fog Signal**.

Remarks:
- The characteristic rhythm of fog signals (other than those actuated by waves, which are irregular) may be more important than their type when mariners are attempting to identify them. The number of sound emissions (e.g. blasts, strokes) and the period must therefore be encoded, where known, using the attributes **signal group**, **signal period** and **signal sequence**.
- Where required, the attribute **signal frequency** must be quoted in Hertz, e.g. a signal frequency of 950 MHz must be encoded as *950000000*.

Distinction: Signal station, warning.

20 Radar, Radio

20.1 Automatic Identification Systems (AIS) (see S-4 – B-489)

20.1.1 AIS equipped aids to navigation (see S-4 – B-489.1)

AIS signals used as an aid to navigation may:
- actually be transmitted from a physical aid to navigation (physical AIS aid to navigation);
- appear to be transmitted from a physical aid to navigation but is actually transmitted from an AIS base station (synthetic AIS aid to navigation); or
- be transmitted from an AIS base station to represent an aid to navigation where a physical aid to navigation does not exist (virtual AIS aid to navigation).

It is not required to encode AIS information on ENCs, as ENCs are intended to be used in conjunction with ECDIS as part of an Integrated Bridge System, in which AIS targets are displayed when in range. If, however, Producing Authority's wish to indicate the presence of a physical or synthetic AIS aid to navigation to aid in the route planning process or for use in ECS or other navigation systems, this may be done using the complex attribute **information** (sub-attribute **text**) on the physical aid to navigation structure (master) feature (see clause X.X), e.g. *Automatic Identification System (AIS) aid to navigation*.

It is currently (May 2012) not possible to encode virtual AIS aid to navigation information on ENCs.

20.2   Radio station

IHO Definition: **RADIO STATION**. A place equipped to transmit radio waves. Such a station may be either stationary or mobile, and may also be provided with a radio receiver. In British terminology, also called w/t station. (IHO Dictionary – S-32).

S-101 Geo Feature: Radio station (RDOSTA)

Primitives: Point

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Call sign	(CALSGN)		TE	0,1
Category of radio station	(CATROS)	1 : circular (non-directional) marine or aero-marine radiobeacon 2 : directional radiobeacon 3 : rotating-pattern radiobeacon 4 : Consol beacon 5 : radio direction-finding station 6 : coast radio station providing QTG service 7 : aeronautical radiobeacon 8 : Decca 9 : Loran C 10 : Differential GNSS 11 : Toran 12 : Omega 13 : Syledis 14 : Chaika (Chayka) 15 : radio telephone station 16 : AIS base station	EN	0,1
Communication channel	(COMCHA)		TE	0,*
Estimated range	(ESTRNG)		RE	0,1
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Orientation			C	0,1
Orientation uncertainty			(S) RE	0,1
Orientation value	(ORIENT)		(S) RE	1,1
Periodic date range			C	0,*

Comment [j129]: S-57 Extension 06/01.

Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Signal frequency	(SIGFRQ)		IN	0,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
~~Recording date~~	~~(RECDAT)~~	~~ISO 8601:1988~~	~~DA~~	~~0,1~~
~~Recording indication~~	~~(RECIND)~~		~~TE~~	~~0,1~~
~~Source indication~~			~~C~~	~~0,*~~
~~Authority~~			~~(S) TE~~	~~1,1~~
~~Nationality~~			~~(S) TE~~	~~1,1~~
~~ID code~~			~~(S) TE~~	~~0,1~~
~~Source~~			~~(S) TE~~	~~0,1~~
~~Source date~~	~~(SORDAT)~~	~~ISO 8601:1988~~	~~(S) DA~~	~~1,1~~

INT 1 Reference: S 10-16

20.2.1 Radio stations (see S-4 – B-480-484)

Transmissions from radio stations may provide mariners with a line of position. Most radio position fixing systems require Radio Direction Finding (RDF) equipment to determine the bearing of the transmitting device; such equipment is generally no longer fitted on vessels. The exception is "emergency use only" VHF-based direction finding services (which do not use RDF equipment. Consequently, the following radio position-fixing stations are now obsolete and there is no longer any value in encoding them on ENCs:
- Circular (non-directional) (RC), directional (RD) and rotating pattern (RW) marine radiobeacons;
- Consol beacons (Consol);
- Aeronautical radiobeacons (Aero RC);
- Radio direction-finding stations (except VHF-based emergency stations) (RG);
- Coast Radio Stations providing 'QTG' service (R).

The feature "radio station" is used to encode the point of transmission of the signal.

If it is required to encode a radio station, it must be done using the feature **Radio Station**.

Remarks:
- The **Radio Station** must only be used to encode the technical equipment itself, independent of the building or structure in which it is installed. If it is required to encode the building or structure (e.g. mast, tower, radar dome), it must be done using an appropriate feature (e.g. **Building**, **Landmark**).
- Further information (e.g. transmission characteristic) may be encoded using complex attributes **information** or **textual description**.
- Each VHF-channel should be indicated, using the attribute **communication channel** (see clause X.X).
- If it is required to encode a DGPS station, it must be done using **Radio Station**, with attribute **category of radio station** = *10* (Differential GNSS).
- Where required, the attribute **signal frequency** must be quoted in Hertz, e.g. a signal frequency of 950 MHz must be encoded as *950000000*.

20.2.2 ~~Marine and aero-marine radiobeacons (see S-4 – B-481)~~

It is no longer useful to encode marine and aero-marine radiobeacons for ENCs.

If it is required to encode a marine and aero-marine radiobeacon, it must be done using a **Radio Station** feature, with attributes:

category of radio station   *1* - circular (omni-directional) marine or aero-marine radiobeacon
                                                        2 - directional radiobeacon
                                                        3 - rotating-pattern radiobeacon
                                                        4 - Consol beacon
orientation   value of the bearing from seaward. Applies only for **category of radio station** = *2*.

Remarks:
- If it is required to encode the bearing line and the recommended track for a directional radiobeacon, it must be done as described in clause X.X. Where the bearing line coincides with a leading line defined by lights or other visual features making up a range system, navigation lines and recommended tracks must not be duplicated. The features making up the range system must be aggregated using the collection feature **C_AGGR** (see clause X.X).

20.2.3   Aeronautical radiobeacons (see S-4 – B-482)

It is no longer useful to encode aeronautical radiobeacons for ENCs.

If it is required to encode an aeronautical radiobeacon, it must be done using a **Radio Station** feature, with attribute **category of radio station** = *7* (aeronautical radiobeacon). The identification signal may be encoded using the attribute **call sign.**

20.2.4   Radio direction-finding stations (see S-4 – B-483)

If it is required to encode a radio direction-finding station, it must be done using a **Radio Station** feature, with attribute **category of radio station** = *5* (radio direction-finding station). The identification signal may be encoded using the attribute **call sign**.

Remarks:
- Direction–finding is now only provided as an emergency service by VHF.

20.2.5   Coast radio stations providing QTG service (see S-4 – B-484)

It is no longer useful to encode coast radio stations providing QTG services for ENCs.

If it is required to encode a coast radio station which provides a QTG service, it must be done using a **Radio Station** feature, with attribute **category of radio station** = *6* (coast radio station providing QTG service).

Distinction: Radar station; radio calling-in point.

20.3   Radar transponder beacon

<u>IHO Definition:</u> **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).	

S-101 Geo Feature: Radar transponder beacon (RTPBCN)

Primitives: Point

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of radar transponder beacon	(CATRTB)	1 : ramark, radar beacon transmitting continuously 2 : racon, radar transponder beacon 3 : leading racon/radar transponder beacon	EN	1,1
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Radar wave length	(RADWAL)		C	0,2
Radar band			(S) TE	1,1
Wave length value			(S) RE	1,1
Sector limit one	(SECTR1)		RE	0,1
Sector limit two	(SECTR2)		RE	0,1
Signal group	(SIGGRP)		TE	0,1
Signal sequence	(SIGSEQ)		TE	0,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private	EN	0,*
Value of maximum range	(VALMXR)		RE	0,1
Information			C	0,*

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

INT 1 Reference: S 2-3

20.3.1   Radar beacons (see S-4 – B-486)

Radar beacons are transmitters operating in the marine radar frequency band. The signals produce a characteristic line on a vessel's radar display enabling the mariner to determine their position with greater certainty than would be possible by means of a normal radar display alone.

If it is required to encode a radar beacon, it must be done using the feature **Radar Transponder Beacon**.

Remarks:
- The **Radar Transponder Beacon** must only be used to encode the technical equipment itself, independent of the building or structure in which it is installed. If it is required to encode the building or structure (e.g. mast, tower, radar dome), it must be done using an appropriate feature (e.g. **Building**, **Landmark**).
- The attribute **signal group** is used to encode morse identification letter(s) for the radar beacon, where known.
- Leading racons are established such that, when their bearing lines are coincident on a vessel's radar display, the bearing serves to indicate the track to be followed. If it is required to encode the bearing line and the recommended track for leading racons, it must be done as described in clause X.X. Where the bearing line coincides with a leading line defined by lights or other visual features making up a range system, navigation lines and recommended tracks must not be duplicated. The features making up the range system must be aggregated using the collection feature **C_AGGR** (see clause X.X).
- If, for some reason, the radar transponder beacon signal is obscured between certain bearings, this information should be encoded using the attributes **sector limit one** and **sector limit two** to encode the "visible" sector, as for lights (see clause X.X).
- The sweep period may be encoded using the complex attribute **information**.

Distinction: Radar line; radar range; radar station.

21 Services

21.1 Pilot boarding place

<table>
<tr><td colspan="6">IHO Definition: PILOT BOARDING PLACE. A location offshore where a pilot may board a vessel in preparation to piloting it through local waters. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).</td></tr>
<tr><td colspan="6"><u>S-101 Geo Feature:</u> Pilot boarding place (PILBOP)</td></tr>
<tr><td colspan="6"><u>Primitives:</u> Point, Surface</td></tr>
<tr><td colspan="2"><i>Real World</i></td><td colspan="2"><i>Paper Chart Symbol</i></td><td colspan="2"><i>ECDIS Symbol</i></td></tr>
<tr><td colspan="2">S-101 Attribute</td><td>S-57 Acronym</td><td>Allowable Encoding Value</td><td>Type</td><td>Multiplicity</td></tr>
<tr><td colspan="2">Call sign</td><td>(CALSGN)</td><td></td><td>TE</td><td>0,1</td></tr>
<tr><td colspan="2">Category of pilot boarding place</td><td>(CATPIL)</td><td>1 : boarding by pilot-cruising vessel
2 : boarding by helicopter
3 : pilot comes out from shore</td><td>EN</td><td>0,1</td></tr>
<tr><td colspan="2">Communication channel</td><td>(COMCHA)</td><td></td><td>TE</td><td>0,*</td></tr>
<tr><td colspan="2">Feature name</td><td></td><td></td><td>C</td><td>0,* (ordered)</td></tr>
<tr><td colspan="2">~~Category of name~~</td><td></td><td>~~1 : official name~~
~~2 : alternate name~~
~~3 : common name~~
~~4 : short name~~
~~5 : display name~~</td><td>~~(S) EN~~</td><td>~~0,1~~</td></tr>
<tr><td></td><td>Display name</td><td></td><td></td><td>(S) BO</td><td>0,1</td></tr>
<tr><td></td><td>Language</td><td></td><td>ISO 639-3</td><td>(S) TE</td><td>0,1</td></tr>
<tr><td></td><td>Name</td><td>(OBJNAM)</td><td></td><td>(S) TE</td><td>1,1</td></tr>
<tr><td colspan="2">Fixed date range</td><td></td><td></td><td>C</td><td>0,1</td></tr>
<tr><td></td><td>Date end</td><td>(DATEND)</td><td>ISO 8601:1988</td><td>(S) DA</td><td>0,1</td></tr>
<tr><td></td><td>Date start</td><td>(DATSTA)</td><td>ISO 8601:1988</td><td>(S) DA</td><td>0,1</td></tr>
<tr><td colspan="2">Periodic date range</td><td></td><td></td><td>C</td><td>0,*</td></tr>
<tr><td></td><td>Date end</td><td>(PEREND)</td><td>ISO 8601:1988</td><td>(S) DA</td><td>1,1</td></tr>
<tr><td></td><td>Date start</td><td>(PERSTA)</td><td>ISO 8601:1988</td><td>(S) DA</td><td>1,1</td></tr>
<tr><td colspan="2">~~Pilot district~~</td><td>~~(PILDST)~~</td><td></td><td>~~TE~~</td><td>~~0,1~~</td></tr>
<tr><td colspan="2">~~Pilot district in national language~~</td><td>~~(NPLDST)~~</td><td></td><td>~~TE~~</td><td>~~0,1~~</td></tr>
<tr><td colspan="2">Status</td><td>(STATUS)</td><td>1 : permanent
2 : occasional
3 : recommended
5 : periodic/intermittent
6 : reserved
9 : mandatory
16 : watched
17 : un-watched
19 : buoyed</td><td>EN</td><td>0,*</td></tr>
<tr><td colspan="2">Information</td><td></td><td></td><td>C</td><td>0,*</td></tr>
<tr><td></td><td>Language</td><td></td><td>ISO 639-3</td><td>(S) TE</td><td>0,1</td></tr>
</table>

Comment [A130]: S-57 Extension 06/01.

Comment [j131]: S-57 Extension 06/01.S-57 Extension 06/01.

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

<u>INT 1 Reference:</u> T 1.1-4

21.1.1 Pilot boarding places (see S-4 – B-491.1-2)

For a pilot boarding place, the pilot vessel may either cruise in the area or come out on request. Off some large ports pilots on outgoing ships may be disembarked at a different location. Pilots may board from a helicopter; it is then less important for a ship to reach the exact position of the boarding place but an approximate position should still be encoded. Some pilot stations are used solely for long-distance (deep-sea) pilots. Pilots may be in constant attendance, in regular attendance at certain limited times, or available by previous arrangement only. The primary purpose of encoded pilotage information is to show the position of the facility. Because of the many variations in the service provided, the main source of information on pilotage must be in an associated publication or product.

If it is required to encode a pilot boarding place, it must be done using the feature **Pilot Boarding Place**.

<u>Remarks:</u>
- Each VHF-channel should be indicated, using the attribute **communication channel** (see clause X.X).
- If it is required to encode the area in which pilotage regulations apply, it should be done using the feature **Pilotage District** (see clause X.X). The relationship between the pilotage district and any associated pilot boarding places should be encoded using an association feature (see clause X.X).

21.1.2 Pilot stations ashore (see S-4 – B-491.4)

If it is required to encode a pilot station ashore, it must be done using a **Building** or **Landmark** feature, with attribute **function** = *11* (pilot office) or *12* (pilot lookout).

<u>Distinction:</u>

21.2   Vessel traffic service area

IHO Definition: **VESSEL TRAFFIC SERVICE**. The area of any service implemented by a relevant authority primarily designed to improve safety and efficiency of traffic flow and the protection of the environment. It may range from simple information messages, to extensive organisation of the traffic involving national or regional schemes. (IHO Dictionary – S-32).	

S-101 Geo Feature: Vessel traffic service area

Primitives: Surface

Real World	Paper Chart Symbol	ECDIS Symbol

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

INT 1 Reference:

21.2.1 Vessel traffic service area

If it is required to encode an area within which a competent authority provides services to vessels as part of a Vessel Traffic Service (VTS), it must be done using the feature **Vessel Traffic Service Area**. The area should

be captured based on the limits of the VTS or VTS sector.

Remarks:
- Separate area **Vessel Traffic System Area** features should be captured for individual VTS sectors where appropriate.

Distinction: Custom zone.

21.3 Coastguard station

IHO Definition: **COASTGUARD STATION.** A station at which a visual/radio/radar marine watch is kept either continuously or at certain times only. (IHO Dictionary – S-32).				
S-101 Geo Feature: Coastguard station (CGUSTA)				
Primitives: Point				
Real World	*Paper Chart Symbol*		*ECDIS Symbol*	

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Communication channel	(COMCHA)		TE	0,*
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Status	(STATUS)	1 : permanent 4 : not in use 5 : periodic/intermittent 16 : watched 17 : un-watched	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
~~Recording date~~	~~(RECDAT)~~	~~ISO 8601:1988~~	~~DA~~	~~0,1~~
~~Recording indication~~	~~(RECIND)~~		~~TE~~	~~0,1~~
~~Source indication~~			~~C~~	~~0,*~~
~~Authority~~			~~(S) TE~~	~~1,1~~
~~Nationality~~			~~(S) TE~~	~~1,1~~
~~ID code~~			~~(S) TE~~	~~0,1~~
~~Source~~			~~(S) TE~~	~~0,1~~

Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: T 10, 11

21.3.1 Coastguard stations (see S-4 – B-492)

The organisation of coast-watching and rescue services differs from country to country. For charting purposes it is assumed that two distinct functions can be recognised, even though they may be parts of the same organisation co-ordinating and effecting life saving and performing other services. Coastguard stations are stations at which a watch is kept either continuously, or at certain times only. They are sited so as to have a commanding view, are often associated with signal stations, and are visually prominent. They are also referred to as watch-keeping stations.

Coastguard stations are located along the coasts of most maritime nations. Their primary purpose in former days was to enforce customs regulations, observe the movements of ships and to watch for signs of distress at sea. These functions are largely superseded by modern telecommunications and Search & Rescue (SAR) arrangements, coordinated by regional Maritime Rescue and Coordination Centres (MRCC).

If it is required to encode a coastguard station, it must be done using the feature **Coastguard Station**.

Remarks:
- Many modern Coastguard services no longer maintain visual watch from fixed stations. However, because stations were usually situated so as to have a commanding view and may therefore be visually prominent and make good fixing marks, the buildings may still be encoded as **Building** or **Landmark**.
- The **Coastguard Station** must only be used to describe the function of the coastguard station, independent of the building or structure itself. If it is required to encode the building or structure in which the coastguard station operates, it must be done using an appropriate feature (e.g. **Building**, **Landmark**).
- Maritime Rescue and Coordination Centres (MRCC) are part of a constantly manned communications watch system. If it is required to encode a MRCC, it should be done using **Coastguard Station**, with complex attribute **information** (sub-attribute **text**) = *Maritime Rescue and Coordination Centre*. The name of the station may be populated using the complex attribute **feature name** (sub-attribute **name**), e.g. *MRCC Swansea*.
- Each VHF-channel should be indicated, using the attribute **communication channel** (see clause X.X).

Distinction: Building, single; rescue station.

21.4   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).	
Warning signals are made to ships at sea. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2012).	

S-101 Geo Feature: Signal station warning (SISTAW)

Primitives: Point

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of signal station warning	(CATSIW)	1 : danger 2 : maritime obstruction 3 : cable 4 : military practice 5 : distress 6 : weather 7 : storm 8 : ice 9 : time 10 : tide 11 : tidal stream 12 : tide gauge 13 : tide scale 14 : diving 15 : water level gauge	EN	1,*
Communication channel	(COMCHA)		TE	0,*
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 12 : illuminated 14 : public 15 : synchronized	EN	0,*

		16 : watched 17 : un-watched		
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
~~Recording date~~	~~(RECDAT)~~	~~ISO 8601:1988~~	~~DA~~	~~0,1~~
~~Recording indication~~	~~(RECIND)~~		~~TE~~	~~0,1~~
~~Source indication~~			~~C~~	~~0,*~~
~~ Authority~~			~~(S) TE~~	~~1,1~~
~~ Nationality~~			~~(S) TE~~	~~1,1~~
~~ ID code~~			~~(S) TE~~	~~0,1~~
~~ Source~~			~~(S) TE~~	~~0,1~~
~~ Source date~~	~~(SORDAT)~~	~~ISO 8601:1988~~	~~(S) DA~~	~~1,1~~

INT 1 Reference: T 20, 26, 28-36

21.4.1 Warning signal stations (see S-4 – B-494; B-496-7)

Signal stations communicating visually have declined in importance. They are encoded on the largest maximum display scale ENC data not only for their main role of signalling information and instructions but also as a form of landmark. The signals generally exhibit lights by day and night but may display shapes or flags by day.

If it is required to encode a warning signal station, it must be done using the feature **Signal Station Warning**.

Remarks:
- The **Signal Station Warning** must only be used to describe the function of the signal station, independent of the building or structure itself. If it is required to encode the building or structure housing the service, it must be done using an appropriate feature (e.g. **Building**, **Landmark**).
- Each VHF-channel should be indicated, using the attribute **communication channel** (see clause X.X).

Distinction: Signal station, traffic.

21.5   Traffic signal stations

IHO Definition: **SIGNAL STATION, TRAFFIC**. A signal station is a place on shore from which signals are made to ships at sea. (IHO Dictionary – S-32).

Traffic signal stations regulate the movement of traffic. (S-57 Edition 3.1, Appendix A – Chapter 1, Page 1.155, November 2000).

S-101 Geo Feature: Signal station traffic (SISTAT)

Primitives: Point

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Category of signal station traffic	(CATSIT)	1 : port control 2 : port entry and departure 3 : International Port Traffic 4 : berthing 5 : dock 6 : lock 7 : flood barrage 8 : bridge passage 9 : dredging 10 : traffic control light	EN	1,*
Communication channel	(COMCHA)		TE	0,*
Feature name			C	0,*
Category of name		1 : official name 2 : alternate name 3 : common name 4 : short name 5 : display name	(S) EN	0,1
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 12 : illuminated 14 : public 15 : synchronized 16 : watched 17 : un-watched	EN	0,*
Information			C	0,*

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

INT 1 Reference: T 21-25.2

21.5.1   Traffic signal stations (see S-4 – B-494-5)

Signal stations communicating visually have declined in importance. They are encoded on the largest maximum display scale ENC data not only for their main role of signalling information and instructions but also as a form of landmark. The signals generally exhibit lights by day and night but may display shapes or flags by day.

The nature of traffic signals varies from country to country and even from port to port. For charting purposes traffic signals can be considered to include:
- Port entry and departure signals;
- Lock, docking and berthing signals;
- Bridge signals;
- International traffic signals.

If it is required to encode a traffic signal station, it must be done using the feature **Signal Station Traffic**.

Remarks:
- If it is required to encode a bridge light marking the centre of a navigable span, it must be done using the feature **Light**.
- The **Signal Station Traffic** must only be used to describe the function of the signal station, independent of the building or structure itself. If it is required to encode the building or structure housing the service, it must be done using an appropriate feature (e.g. **Building**, **Landmark**).
- Each VHF-channel should be indicated, using the attribute **communication channel** (see clause X.X).

Distinction: Signal station, warning.

21.6   Rescue station

IHO Definition: **RESCUE STATION**. A place where equipment for saving life at sea is maintained. Also called life saving station. (IHO Dictionary – S-32).

S-101 Geo Feature: Rescue station (RSCSTA)

Primitives: Point

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Category of rescue station	(CATRSC)	1 : rescue station with lifeboat 2 : rescue station with rocket 4 : refuge for shipwrecked mariners 5 : refuge for intertidal area walkers 6 : lifeboat lying at a mooring 7 : aid radio station 8 : first aid equipment	EN	0,*
Communication channel	(COMCHA)		TE	0,*
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1
Periodic date range			C	0,*
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Status	(STATUS)	1 : permanent 2 : occasional 4 : not in use 5 : periodic/intermittent 7 : temporary 8 : private 14 : public 16 : watched 17 : un-watched	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1

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

<u>INT 1 Reference:</u> T 12-14~~; Q 124~~

21.6.1   Rescue station (see S-4 – B-490 and B-493)

The organisation of coast-watching and rescue services differs from country to country. For charting purposes it is assumed that these two distinct functions can be recognised individually, even though they may be parts of the same organisation co-ordinating and effecting life saving and performing other services.

Rescue stations are the places at which life saving equipment is held, especially lifeboats (usually in relatively sheltered positions, near sea level). Rescue stations are not necessarily visually prominent. The range of equipment used in rescue is wide, e.g. search and rescue helicopters; fast, long-distance lifeboats; inflatable inshore lifeboats.

If it is required to encode a rescue station, it must be done using the feature **Rescue Station**.

<u>Remarks:</u>
- The **Rescue Station** 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. **Building**, **Landmark**).
- If it is required to encode a refuge beacon, it must be done using a **Beacon Special Purpose/General feature**, with attribute **category of special purpose mark** = *44* (refuge beacon), not by using **Rescue Station**.
- Each VHF-channel should be indicated, using the attribute **communication channel** (see clause X.X).

<u>Distinction:</u> Beacon special purpose/general; building single; coastguard station.

21.7   Harbour facility

IHO Definition: **HARBOUR FACILITY**. A Harbour installation with a service or commercial operation of public interest. (S-57 Edition 3.1, Appendix A – Chapter 1,Page 1.81, November 2000).
S-101 Geo Feature: Harbour facility (HRBFAC)
Primitives: Point, Surface

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity	
Category of harbour facility	(CATHAF)	1 : RoRo-terminal 3 : ferry terminal 4 : fishing harbour 5 : yacht harbour/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 15 : pilotage service	EN	1,*	**Comment [j132]:** S-57 Extension 06/01.
Communication channel	(COMCHA)		TE	0,*	
Condition	(CONDTN)	1 : under construction 2 : ruined 3 : under reclamation 5 : planned construction	EN	0,1	
Feature name			C	0,*	
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~	
Display name			(S) BO	0,1	
Language		ISO 639-3	(S) TE	0,1	
Name	(OBJNAM)		(S) TE	1,1	
Fixed date range			C	0,1	
Date end	(DATEND)	ISO 8601:1988	(S) DA	0,1	
Date start	(DATSTA)	ISO 8601:1988	(S) DA	0,1	
Nature of construction	(NATCON)	1 : masonry 2 : concreted 3 : loose boulders 6 : wooden 7 : metal 9 : painted	EN	0,*	
Periodic date range			C	0,*	
Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1	
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1	
Product	(PRODCT)	1 : oil 2 : gas	EN	0,1	**Comment [A133]:** S-57 Extension 06/01.

		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		
Restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 7 : entry prohibited 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 14 : area to be avoided 15 : construction prohibited 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historical artefacts prohibited 23 : cargo transhipment (lightening) prohibited 24 : dragging prohibited 25 : stopping prohibited 26 : landing prohibited 27 : speed restricted 28 : swimming prohibited	EN	0,*
Status	(STATUS)	1 : permanent 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 9 : mandatory 12 : illuminated 13 : historic 14 : public 16 : watched 17 : un-watched	EN	0,*

Comment [A134]: S-57 Extension 06/01.

Comment [j135]: S-57 Extension 06/01.

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

<u>INT 1 Reference:</u> F 10, 11.1, 50

21.7.1 Harbour facilities (see S-4 – B-320 and B-321.5)

If it is required to encode a harbour facility, it must be done using the feature **Harbour Facility**.

<u>Remarks:</u>
- Fishing harbours or ports are equipped to provide for the particular needs of fishing boats. Boat harbours and marinas are areas of sheltered water, generally within harbours or ports, set aside for the use of small craft, usually with moorings, buoys, and, in the case of marinas, berthing facilities.
- Depending on the navigational purpose, harbour facilities are defined by: an area including docks, basins, and dockside equipment; or a point.
- If it is required to encode a terminal with facilities to load/unload or store shipping containers, this should be done using **Harbour Facility** with attribute **category of harbour facility** = *10* (container terminal).
- If it is required to encode a covered terminal into which ships can go, this should be done using **Harbour Facility** with the purpose of the terminal defined by **category of harbour facility**. The roof of the terminal may be encoded using the attribute **nature of construction**, and the maximum height and/or draught of vessels able to use the terminal encoded using the complex attribute **information**. Alternatively, the roofed structure may be encoded using a **Building** feature (see clause X.X).
- Each VHF-channel should be indicated, using the attribute **communication channel** (see clause X.X).

<u>Distinction:</u> Small craft facility.

21.8   Small craft facility

<u>IHO Definition:</u> **SMALL CRAFT FACILITY**. A place at which a service generally of interest to small craft or pleasure boats is available. (S-57 Edition 3.1, Appendix A – Chapter 1,Page 1.162, November 2000).
<u>**S-101 Geo Feature:**</u> **Small craft facility (SMCFAC)**
<u>**Primitives:**</u> **Point, Surface**

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Category of small craft facility	(CATSCF)	1 : visitors berth 2 : nautical club 3 : boat hoist 4 : sailmaker 5 : boatyard 6 : public inn 7 : restaurant 8 : chandler 9 : provisions 10 : doctor 11 : pharmacy 12 : water tap 13 : fuel station 14 : electricity 15 : bottle gas 16 : showers 17 : launderette 18 : public toilets 19 : post box 20 : public telephone 21 : refuse bin 22 : car park 23 : parking for boats and trailers 24 : caravan site 25 : camping site 26 : sewerage pump-out station 27 : emergency telephone 28 : landing/launching place for boats 29 : visitors mooring 30 : scrubbing berth 31 : picnic area 32 : mechanics workshop 33 : guard and/or security service	EN	1,*
Feature name			C	0,*
~~Category of name~~		~~1 : official name~~ ~~2 : alternate name~~ ~~3 : common name~~ ~~4 : short name~~ ~~5 : display name~~	~~(S) EN~~	~~0,1~~
Display name			(S) BO	0,1
Language		ISO 639-3	(S) TE	0,1
Name	(OBJNAM)		(S) TE	1,1
Periodic date range			C	0,*

Date end	(PEREND)	ISO 8601:1988	(S) DA	1,1
Date start	(PERSTA)	ISO 8601:1988	(S) DA	1,1
Status	(STATUS)	1 : permanent 2 : occasional 3 : recommended 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 8 : private 9 : mandatory 12 : illuminated 14 : public 16 : watched 17 : un-watched	EN	0,*
Information			C	0,*
Language		ISO 639-3	(S) TE	0,1
Text	(INFORM)		(S) TE	1,1
Pictorial representation	(PICREP)		TE	0,1
Textual description			C	0,*
File reference	(TXTDSC)		(S) TE	1,1
Language		ISO 639-3	(S) TE	0,1
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1
Recording date	(RECDAT)	ISO 8601:1988	DA	0,1
Recording indication	(RECIND)		TE	0,1
Source indication			C	0,*
Authority			(S) TE	1,1
Nationality			(S) TE	1,1
ID code			(S) TE	0,1
Source			(S) TE	0,1
Source date	(SORDAT)	ISO 8601:1988	(S) DA	1,1

INT 1 Reference: E 37.1-2; F 11.3, 19.2; Q 45; U 6-13, 15-31

21.8.1   Small craft facilities (see S-4 – B-320.1-2)

If it is required to encode a small craft facility, it must be done using the feature **Small Craft Facility**.

Remarks:
- The **Small Craft Facility** must only be used to encode the function. In addition, if it is required to encode a physical feature (e.g. building, mooring buoy), it must be done using an appropriate feature (e.g. **Building**, **Mooring/Warping Facility**).

Distinction: Building, single; harbour facility; shoreline construction.