Marine Information Overlays
Ice Coverage

Object Catalogue - Attributes

Edition 1.0

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2.1 Introduction

Each attribute is specified in a standardised way, under the following headings:

- Attribute: Attribute name.
- Acronym: six character code for the Attribute.
- Code: integer code to be used in the coding of data.
- Attribute type: one character code for the Attribute type (see below)

  Each Attribute is assigned to one of six types:

  * enumerated ('E'): The expected input is a number selected from a list of pre-defined attribute values. Exactly one value must be chosen. The abbreviation for this type is 'E'.

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

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

  * float ('F'): The expected input is a floating point numeric value with defined range, resolution, units and format. The abbreviation for this type is 'F'.

  * integer ('I'): The expected input is an integer numeric value with defined range, units and format. The abbreviation for this type is 'I'.

  * coded string ('A'): The expected input is a string of ASCII characters in a predefined format. The information is encoded according to defined coding systems e.g.: the nationality will be encoded by a two character field specified by ISO 3166 'Codes for the Representation of Names of Countries', e.g. Canada => 'CA' (refer to S-62). The abbreviation for this type is 'A'.

  * free text ('S'): The expected input is a free format alphanumeric string. It may be a file name which points to a text or graphic file. The abbreviation for this type is 'S'.

- Expected input:

  Depending on the attribute type, the expected input is defined in the following ways:

  For 'E' and 'L' type attributes a list of ID numbers with associated, defined, meanings is given. Where an attribute value which appeared in a previous edition of the Standard is no longer used, it is retained in the list but is struck-through.
  For 'A', 'F', 'I' and 'S'type attributes the expected input is indicated in accordance with the type (see above).

  In certain circumstances, it may be necessary to indicate to the recipient of a data set that the value of a certain attribute for an instance of an object class is unknown. This fact is encoded by a zero length attribute value sub-field, e.g. COLOUR∇ (where ∇ is the subfield delimiter). This applies to all attribute types (see S-57 Part 3 clause 2.1).

- Definitions: a definition of the Attribute, or in the case of ‘E’ or ‘L’ type Attributes, a definition of each value of an Attribute.

- References:

  * INT 1: Reference to the system of numbering for the paper chart feature as used in the ‘International Chart Series INT 1 Symbols, Abbreviations, Terms used on Charts’. INT 1 was one of the major guidelines for the definition of attributes

  * M-4: Reference to the paragraph number in the ‘Chart Specifications of the IHO’, M-4. This was another guideline for the definition and description of the attributes..

- Minimum Value: The minimum value for the expected input is indicated for floating point and integer attributes.

- Maximum Value: The maximum value for the expected input is indicated for floating point and integer attributes.

- Remarks: Under ‘Remarks’, further comments and notes may be given.

Depending on the type of attribute, the following information is provided:

- Indication: For coded string type attributes (S) it indicates the construction of the string.

  For integer (I) and floating point (F) type attributes it indicates the units and resolution of the input.

- Format The ‘Format’ statement indicates the recommended standard input template. Attributes that are identified as requiring a mandatory format, are indicated by the term **(mandatory)**. For other attributes, the format can be either implied by the domain of valid attribute values or will be variable in length depending on the attribute and its data type

- Example: an example of coded input.

There are three National Language Attributes which are defined in Section 3. These are all string type attributes intended to hold text in a national language.

There are two Attributes that are defined as attributes of spatial objects. For further information see Section 4.

2.2 Feature Object Attributes

FEATURE OBJECT ATTRIBUTES

Attribute: **Category of coverage**

Acronym: **CATCOV** Code: **18**

Attribute type: E

Expected input:

ID	Meaning
1	coverage available
2	no coverage available

Definitions:

coverage available:	continuous coverage of spatial objects is available within this area.
no coverage available:	an area containing no spatial objects.

Remarks:

No remarks.

FEATURE OBJECT ATTRIBUTES

Attribute: **Category of recommended track**

Acronym: **CATTRK** Code: **54**

Attribute type: E

Expected input:

ID	Meaning	INT 1	M-4
1	based on a system of fixed marks	IM 3;	434.1-2;
2	not based on a system of fixed marks	IM 4;	434.1-2;

Definitions:

based on a system of fixed marks:
a straight route (known as a recommended track, range or leading line), which comprises at least two structures (usually beacons or daymarks) and/or natural features, which may carry lights and/or top-marks. The structures/features are positioned so that when observed to be in line, a vessel can follow a known bearing with safety. (adapted from International Association of Lighthouse Authorities - IALA Aids to Navigation Guide, 1990)

not based on a system of fixed marks:
a route (known as a recommended track or preferred route) which is not based on a series of structures or features in line.

Remarks:

No remarks.

FEATURE OBJECT ATTRIBUTES

Attribute: **Date end**

Acronym: **DATEND** Code: **85**

Attribute type: A

Indication:

the ‘date, end’ should be encoded using 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD), according to ISO 8601: 1988.

Format:

CCYYMMDD **(mandatory)**

Example:

19961007 for 07 October 1996 as ending date.

Remarks:

The attribute ‘date end’ indicates the latest date on which an object (e.g. a buoy) will be present.

This attribute is to be used to indicate the removal or cancellation of an object at a specific date in the future. See also ‘periodic date end’

FEATURE OBJECT ATTRIBUTES

Attribute: **Date start**

Acronym: **DATSTA** Code: **86**

Attribute type: A

Indication:

The ‘date, start’ should be encoded using 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD), according to ISO 8601: 1988.

Format:

CCYYMMDD **(mandatory)**

Example:

19960822 for 22 August 1996 as starting date.

Remarks:

The attribute ‘date, start’ indicates the earliest date on which an object (e.g. a buoy) will be present.

This attribute is to be used to indicate the deployment or implementation of an object at a specific date in the future. See also ‘periodic date start’.

FEATURE OBJECT ATTRIBUTES

Attribute: **Depth range value 1**

Acronym: **DRVAL1** Code: **87**

Attribute type: F

Definition:

The minimum (shoalest) value of a depth range.

References:

INT 1: II 21; IM 6;
M-4: 414; 432.4; 434.3-4;

Indication:

Unit: defined in the DUNI subfield of the DSPM record.

Resolution: 0.1 m or 0.1 fm or 0.1 ft

Format:

sxxxxx.x
s: sign, negative values only.

Example:

50 for a minimum depth of 50 metres.

Remarks:

Where the area dries, the value is negative.

FEATURE OBJECT ATTRIBUTES

Attribute: **Depth range value 2**

Acronym: **DRVAL2** Code: **88**

Attribute type: F

Definition:

The maximum (deepest) value of a depth range.

References:

INT 1: II 21; IM 6;
M-4: 414; 432.4; 434.3-4;

Indication:

Unit: defined in the DUNI subfield of the DSPM record.

Resolution: 0.1 m or 0.1 fm or 0.1 ft

Format:

sxxxxx.x
s: sign, negative values only.

Example:

100 for a minimum depth of 100 metres.

Remarks:

Where the area dries, the value is negative.

FEATURE OBJECT ATTRIBUTES

Attribute: **Horizontal accuracy**

Acronym: **HORACC** Code: **97**

Attribute type: F

Definition:

The best estimate of the horizontal accuracy of horizontal clearance and distances.

Minimum value: 0

Indication:

Unit:	defined in the HUNI subfield of the DSPM record or in the HUNITS attribute of the M_UNIT meta object class, e.g. metre (m)
Resolution:	0.1 m or 0.1 ft

Format:

xx.x

Example:

0.5	for an error of 0.5 metre.

Remarks:

The expected input is the radius of the two-dimensional error.

The error is assumed to be positive and negative. The plus/minus character shall not be encoded.

FEATURE OBJECT ATTRIBUTES

Attribute: **Ice Attribute Total Concentration**

Acronym: **iceact** Code: **30300**

Attribute type: E

Expected Input:

ID	Meaning
1	Ice Free
2	Open Water (< 1/10 ice)
3	Bergy Water
10	1/10 ice
12	1/10 to 2/10 ice
13	1/10 to 3/10 ice
20	2/10 ice
23	2/10 to 3/10 ice
24	2/10 to 4/10 ice
30	3/10 ice
34	3/10 to 4/10 ice
35	3/10 to 5/10 ice
40	4/10 ice
45	4/10 to 5/10 ice
46	4/10 to 6/10 ice
50	5/10 ice
56	5/10 to 6/10 ice
57	5/10 to 7/10 ice
60	6/10 ice
67	6/10 to 7/10 ice
68	6/10 to 8/10 ice
70	7/10 ice
78	7/10 to 8/10 ice
79	7/10 to 9/10 ice
80	8/10 ice
81	8/10 to 10/10
89	8/10 to 9/10; ice
90	9/10 ice
91	9/10 to 10/10 ice
92	10/10 ice

Definition:

Ice Attribute Total Concentration specifies the total concentration of ice in an area (‘Ct’).

References:

"Workshop on International Standards for Ice Information in ECDIS," June 27-29, 1995, Canada/Germany/United States.

"SIGRID-3: A Vector Archive Format for Sea Ice Charts", JCOMM Technical Report No. 23, 2004

Remarks:

This attribute represents the ratio expressed in tenths describing the total area of the water surface covered by ice as a fraction of the whole area.

FEATURE OBJECT ATTRIBUTES

Attribute: **Ice Attribute Partial Concentration**

Acronym: **iceapc** Code: **30301**

Attribute type: L

Expected Input:

ID	Meaning
1	Ice Free
2	Open Water (< 1/10 ice)
3	Bergy Water
10	1/10 ice
12	1/10 to 2/10 ice
13	1/10 to 3/10 ice
20	2/10 ice
23	2/10 to 3/10 ice
24	2/10 to 4/10 ice
30	3/10 ice
34	3/10 to 4/10 ice
35	3/10 to 5/10 ice
40	4/10 ice
45	4/10 to 5/10 ice
46	4/10 to 6/10 ice
50	5/10 ice
56	5/10 to 6/10 ice
57	5/10 to 7/10 ice
60	6/10 ice
67	6/10 to 7/10 ice
68	6/10 to 8/10 ice
70	7/10 ice
78	7/10 to 8/10 ice
79	7/10 to 9/10 ice
80	8/10 ice
81	8/10 to 10/10
89	8/10 to 9/10; ice
90	9/10 ice
91	9/10 to 10/10 ice
92	10/10 ice

Definition:

Ice Attribute Partial Concentration specifies the partial concentrations of ice in an area (‘Ca, Cb and Cc’).

References:

"Workshop on International Standards for Ice Information in ECDIS," June 27-29, 1995, Canada/Germany/United States.

“Ice in ECDIS Workshop,” June 3-4, 2000, St. John’s, Canada.

“SIGRID-3: A Vector Archive Format for Sea Ice Charts”, JCOMM Technical Report No. 23, 2004

Remarks:

Partial concentrations of ice are reported in order of decreasing thickness and are represented as an S-57 List attribute. Values are separated by a comma.

When only one ice type is present the partial concentration shall not be indicated.

Missing values are represented by the absence of any value of the attribute, which in ISO 8211 encoding of S57, would be adjacent commas.

FEATURE OBJECT ATTRIBUTES

Attribute: **Ice Drift Direction**

Acronym: **iceddr** Code: **30302**

Attribute type: E

Expected Input:

ID	Meaning
1	No Ice Motion
2	Ice Drift to NE (45°)
3	Ice Drift to E (90°)
4	Ice Drift to SE (135°)
5	Ice Drift to S (180°)
6	Ice Drift to SW (225°)
7	Ice Drift to W (270°)
8	Ice Drift to NW (315°)
9	Ice Drift to N (0°)
10	Variable

Definition:

Ice drift direction indicates the direction in which an ice mass is drifting.

References:

"Workshop on International Standards for Ice Information in ECDIS," June 27-29, 1995, Canada/Germany/United States.

"Ice in ECDIS Workshop," June 3-4, 2000, St. John's, Canada.

"International System of Sea-Ice Symbols", WMO No. 259, TP. 145, Supplement No. 4, 1970.

Remarks:

FEATURE OBJECT ATTRIBUTES

Attribute: **Ice Drift Distance**

Acronym: **icedis** Code: **30306**

Attribute type: I

Definitions:

Ice drift distance describes the total distance which an ice mass is forecast to travel in the next 24 hours.

References:

MANICE (Manual of Standard Procedures for Observing and Reporting Ice Conditions), Canadian Ice Service, Meteorological Service of Canada, Revised Ninth Edition, June 2005

Indication:

Unit: nautical miles (nm)
Resolution: 1nm

Format:

xx

Example:

16 for a distance of 16 nautical miles.

Remarks:

A numeric value of the expected distance an ice mass will travel expressed in nautical miles.

Distinction:

Ice drift speed

FEATURE OBJECT ATTRIBUTES

Attribute: **Ice Drift Speed**

Acronym: **icedsp** Code: **30303**

Attribute type: F

Definitions:

Ice drift speed describes the speed at which an ice mass is traveling.

References:

"Workshop on International Standards for Ice Information in ECDIS," June 27-29, 1995, Canada/Germany/United States.

"Ice in ECDIS Workshop," June 3-4, 2000, St. John's, Canada.

"International System of Sea-Ice Symbols", WMO No. 259, TP. 145, Supplement No. 4, 1970.

Indication:

Unit: knot (kt)
Resolution: 0.1kt

Format:

xx.x

Example:

1.6 for a velocity of 1.6 knots.

Remarks:

A numeric value of the speed of an ice mass expressed in knots.

Distinction:

Ice drift distance

FEATURE OBJECT ATTRIBUTES

Attribute: **Floe Sizes**

Acronym: **iceflz** Code: **30304**

Attribute type:L

Expected Input:

ID	Meaning
1	Pancake Ice (30 cm to 3m across)
2	Shuga/Small Ice Cake; Brash Ice (<2m across)
3	Ice Cake (<20m across)
4	Small Floe (20 to <100m across)
5	Medium Floe (100 to 500m)
6	Big Floe (500 to <2000m across)
7	Vast Floe (2000 to10000m across)
8	Giant Floe (>10000m across)
9	Fast Ice
10	Growlers, Floebergs or Floebits
11	Icebergs

Definition:

Floe Sizes describe the predominate forms of ice floe sizes (‘Fa,Fb and Fc) corresponding to the ice Stages of Development Sa, Sb and Sc respectively. Optionally, predominant (Fp) and secondary (Fs) floe size can be reported independently from Sa, Sb, and Sc.

References:

"Workshop on International Standards for Ice Information in ECDIS," June 27-29, 1995, Canada/Germany/United States.”

Ice in ECDIS Workshop,” June 3,4, 2000, St. John’s, Canada.

“SIGRID-3: A Vector Archive Format for Sea Ice Charts”, JCOMM Technical Report No. 23, 2004

Remarks:

The "Floe Sizes" Attribute indicates the floe size corresponding to the respective stage identified in the Stages of Development Attribute and reported as a single enumerated value or as a set of values represented as an S-57 List (or repeating) attribute.

FEATURE OBJECT ATTRIBUTES

Attribute: **Ice Stage of Development**

Acronym: **icesod** Code: **30305**

Attribute type: L

Expected Input:

ID	Meaning
1	Ice Free
80	No stage of development
81	New Ice (<10 cm)
82	Nilas Ice Rind (<10 cm)
83	Young Ice (10 to <30 cm)
84	Grey Ice (10 to <15 cm)
85	Grey – White Ice (15 to <30 cm)
86	First Year Ice (30 to 200 cm)
87	Thin First Year Ice (30 to <70 cm)
88	Thin First Year Ice Stage 1 (30 to <50 cm)
89	Thin First Year Ice Stage 2 (50 to <70 cm)
91	Medium First Year Ice (70 to 120 cm)
93	Thick First Year Ice (>120 cm)
95	Old Ice
96	Second Year Ice
97	Multi-Year Ice
98	Glacier Ice (Icebergs)

Definition:

Ice Stage of Development describe the ages and thicknesses of the ice (‘So,Sa,Sb,Sc and Sd’).

References:

"Workshop on International Standards for Ice Information in ECDIS," June 27-29, 1995, Canada/Germany/United States.

“Ice in ECDIS Workshop,” June 3-4, 2000, St. John’s, Canada.

“SIGRID-3: A Vector Archive Format for Sea Ice Charts”, JCOMM Technical Report No. 23, 2004

Remarks:

Partial concentration Stage of Development is reported in order from the thickest to the thinnest. The following categories are defined:
So – Stage of Development of ice thicker than Sa but having a concentration of less than 1/10.
Sa - Thickest/oldest; Stage of Development of ice concentration C_a.
Sb - Second thickest/oldest; Stage of Development of ice concentration C_b.
Sc - Third thickest/oldest; Stage of Development of ice concentration C_c.
Sd – Stage of Development of any other remaining class.

FEATURE OBJECT ATTRIBUTES

Attribute: **Information**

Acronym: **INFORM** Code: **102**

Attribute type: S

Definition:

Textual information about the object.

References:

INT 1:	IA 16;
M-4:	242.35;

Remarks:

The textual information could be, for example, a list, a table or a text.

This attribute should be used, for example, to hold the information that is shown on paper charts by cautionary and explanatory notes.

No formatting of text is possible within INFORM. If formatted text is required, then the attribute TXTDSC must be used.

FEATURE OBJECT ATTRIBUTES

Attribute: **Object name**

Acronym: **OBJNAM** Code: **116**

Attribute type: S

Definition:

The individual name of an object.

References:

INT 1: ID 7, IF 19, IN 12.23;

M-4: 371; 323.12; 431.23; 431.5;

Remarks:

No remarks.

FEATURE OBJECT ATTRIBUTES

Attribute: **Orientation**

Acronym: **ORIENT** Code: **117**

Attribute type: F

Definition:

The angular distance measured from true north to the major axis of the object. (Digital Geographic Information Working Group -DGIWG, Oct.87)

References:

INT 1:	IM 1-4, 40; IP 20.1-2, 21, 30.1-2, 31; IS 3.5, 11;
M-4:	433.2-6; 434.1-2; 475.6-8; 487.2; 488;

Minimum Value: 0

Maximum Value: 360

Indication:

Unit:	degree (°)
Resolution:	0.01 degree

Conversion factor: one tenth of a second = 0.000028 degree

Format:

xxx.xx

Example:

225.00 for an orientation of 225 degrees (ie South West)

Remarks

No remarks.

FEATURE OBJECT ATTRIBUTES

Attribute: **Periodic date end**

Acronym: **PEREND** Code: **118**

Attribute type: A

Definition:

The end of the active period for a seasonal object (e.g. a buoy). See also ‘date end’.

References:

INT 1: IQ71;

M-4: 460.5;

Indication:

the ‘periodic date end’ should be encoded using 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD). When no specific year is required (ie the object is removed at the same time each year) the following two cases may be considered:

- same day each year: --MMDD
- same month each year: --MM

This conforms to ISO 8601: 1988.

Format:

CCYYMMDD	(full date, **mandatory**)
--MMDD	(same day each year, **mandatory**)
--MM	(same month each year, **mandatory**)

Example:

--1015 for an ending date of 15 October each year.

Remarks:

No remarks.

FEATURE OBJECT ATTRIBUTES

Attribute: **Periodic date start**

Acronym: **PERSTA** Code: **119**

Attribute type: A

Definition:

The start of the active period for a seasonal object (e.g. a recommended route). See also ‘date start’.

References:

INT 1: IQ71;

M-4: 460.5;

Indication:

the ‘periodic date, start’ should be encoded using 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD). When no specific year is required (ie the object is deployed at the same time each year) the following two cases may be considered:

- same day each year: --MMDD
- same month each year: --MM

This conforms to ISO 8601: 1988.

Format:

CCYYMMDD (full date, **mandatory**)
--MMDD (same day each year, **mandatory**)
--MM (same month each year, **mandatory**)

Example:

--04 for an operation starting in April each year.

Remarks:

No remarks.

FEATURE OBJECT ATTRIBUTES

Attribute: **Pictorial representation**

Acronym: **PICREP** Code: **120**

Attribute type: S

Definition:

Indicates whether a pictorial representation of the object is available.

References:

INT 1: IE 3.12;

M-4: 456.5; 457.3;

Indication:

the string encodes the file name of an external graphic file (pixel/vector)

Remarks:

The ‘pictorial representation’ could be a drawing or a photo.

FEATURE OBJECT ATTRIBUTES

Attribute: **Quality of sounding measurement**

Acronym: **QUASOU** Code: **125**

Attribute type: L

Expected input:

ID	Meaning	INT 1	M-4
1	depth known		
2	depth unknown	IK 40;	422.9;
3	doubtful sounding	II 2;	417; 424.4;
4	unreliable sounding	II 14;	412.4;
5	no bottom found at value shown	II 13;	412.3;
6	least depth known	IK 26-27;	422.3-4;
7	least depth unknown, safe clearance at value shown	IK 30;	422.7;
8	value reported (not surveyed)	II 3.1;	417, 424.5;
9	value reported (not confirmed)	II 4;	
10	maintained depth	II 23;	414.2;
11	not regularly maintained		

Definitions:

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

depth unknown: the depth from chart datum to the bottom is unknown.

doubtful sounding: a depth that may be less than indicated. (adapted from IHO Dictionary, S-32, 5th Edition, 4840)

unreliable sounding: a depth that is considered to be an unreliable value.

no bottom found at value shown:
upon investigation the bottom was not found at this depth. (adapted from IHO Dictionary, S-32, 5th Edition, 4848)

least depth known: the shoalest depth over a feature is of known value. (adapted from IHO Dictionary, S-32, 5th Edition, 2705)

least depth unknown, safe clearance at depth shown:
the least depth over a feature is unknown, but there is considered to be safe clearance at this depth.

value reported (not surveyed):
depth value obtained from a report, but not fully surveyed.

value reported (not confirmed):
depth value obtained from a report, which it has not been possible to confirm.

maintained depth: the depth at which a channel is kept by human influence, usually by dredging. (IHO Dictionary, S-32, 5th Edition, 3057)

not regularly maintained:
depths may be altered by human influence, but will not be routinely maintained.

Remarks:

The attribute ‘quality of sounding measurement’ indicates the reliability of the value of depth measurement.

FEATURE OBJECT ATTRIBUTES

Attribute: **Scale maximum**

Acronym: **SCAMAX** Code: **132**

Attribute type: I

Definition:

The maximum scale at which the object may be used e.g. for ECDIS presentation.

Minimum Value: 1

Indication:

the modulus of the scale is indicated, that is 1:25 000 is encoded as 25000;

Unit: none
resolution: 1

Format:

xxxxxxxx

Example:

If a particular maximum scale is specified as 1:25 000 (encoded as 25000), an example of a larger scale would be 1:20 000 (encoded as 20000);

Remarks:

No remarks.

FEATURE OBJECT ATTRIBUTES

Attribute: **Scale Minimum**

Acronym: **SCAMIN** Code: **133**

Attribute type: I

Definition:

The minimum scale at which the object may be used e.g. for ECDIS presentation.

Minimum Value: 1

Indication:

the modulus of the scale is indicated, that is 1:1 250 000 is encoded as 1250000;

Unit: none
resolution: 1

Format:

xxxxxxxx

Example:

If a particular minimum scale is specified as 1:1 250 000 (encoded as 1250000), and an example of a smaller scale would be 1:2 000 000 (encoded as 2000000);

Remarks:

No remarks.

FEATURE OBJECT ATTRIBUTES

Attribute: **Sounding accuracy**

Acronym: **SOUACC** Code: **144**

Attribute type: F

Expected input:

The maximum of the one-dimensional error.

The error is assumed to be positive and negative. The plus/minus character shall not be encoded.

Definition:

The best estimate of the accuracy of the sounding data.

Minimum value: 0

Indication:

Unit:	defined in the DUNI subfield of the DSPM record or in the DUNITS attribute of the M_UNIT meta object class, e.g. metre (m)
Resolution:	0.1 m or 0.1 fm or 0.1 ft

Format:

xx.x

Example:

0.3	for a maximum error of 0.3 metre.

Remarks:

No remarks

FEATURE OBJECT ATTRIBUTES

Attribute: **Source date**

Acronym: **SORDAT** Code: **147**

Attribute type: A

Definition:

The production date of the source, e.g. the date of measurement.

Indication:

The source should be encoded using 4 digits for the calendar year (CCYY), 2 digits for the months (MM) and 2 digits for the Day (DD), according to ISO 8601: 1988.

Format:

CCYYMMDD **(mandatory)**

Example:

19820506 for 6 May 1982 as source date.

Remarks:

No remarks.

FEATURE OBJECT ATTRIBUTES

Attribute: **Source indication**

Acronym: **SORIND** Code: **148**

Attribute type: A

Definition:

Information about the source of the object.

Indication:

Country (c2): **(mandatory)**	Two letter code from ISO 3166 (S-62)
Authority (c2): **(mandatory)**	A string of two alphanumeric characters (refer to S-62 and OpenECDIS.org), e.g. Canadian Ice Service = 4I; German Bundesamt für Seeschiffahrt und Hydrographie = DE
Source (c5):	Graphic e.g. plotting sheet, paper chart = graph Report e.g. wreck report = reprt Satellite Imagery = image
IDCode (c...):	e.g. Code of paper chart or report

Format:

c2,**c2**,c5,c…

Example:

CA,4I,image,12345

FEATURE OBJECT ATTRIBUTES

Attribute: **Status**

Acronym: **STATUS** Code: **149**

Attribute type: L

Expected input:

ID	Meaning	INT 1	M-4
1	permanent		
2	occasional	IP 50;	473.2;
3	recommended	IN 10;	431.1;
4	not in use	IL 14, 44;	444.7;
5	periodic/intermittent	IC 21; IQ 71;	353.3; 460.5;
6	reserved	IN 12.9;	
7	temporary	IP 54;	
9	mandatory		

Definitions:

permanent:	intended to last or function indefinitely. (The Concise Oxford Dictionary, 7th Edition)
occasional:	acting on special occasions; happening irregularly. (The Concise Oxford Dictionary, 7th Edition)
recommended:	presented as worthy of confidence, acceptance, use, etc. (The Macquarie Dictionary, 1988)
not in use:	no longer used for the purpose intended; disused.
periodic/intermittent:	recurring at intervals. (The Concise Oxford Dictionary, 7th Edition)
reserved:	set apart for some specific use. (adapted from The Concise Oxford Dictionary, 7th Edition)
temporary:	meant to last only for a time. (The Concise Oxford Dictionary)
mandatory:	compulsory; enforced. (The Concise Oxford Dictionary, 7th Edition)

Remarks:

No remarks.

FEATURE OBJECT ATTRIBUTES

Attribute: **Technology of Sounding measurement**

Acronym: **TECSOU** Code: **156**

Attribute type: L

INT 1 Reference: II 24; IK 2, 27, 42;

Chart Specification: 415; 415.1-2; 422.3-4; 422.9;

Expected input:

ID	Meaning	INT 1	M-4
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	II 24;IK 2,27,42;	415; 422.3; 422.9;
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		

Definitions:

found by echo-sounder: the depth was determined by using an instrument that determines depth of water by measuring the time interval between emission of a sonic or ultrasonic signal and return of its echo from the bottom. (adapted from IHO Dictionary, S-32, 1547)

found by side-scan-sonar: the depth was computed from a record produced by active sonar in which fixed acoustic beams are directed into the water perpendicularly to the direction of travel to scan the bottom and generate a record of the bottom configuration. (adapted from IHO Dictionary, S-32, 4710)

found by multi-beam: the depth was determined by using a wide swath echo sounder that uses multiple beams to measure depths directly below and transverse to the ship=s track. (adapted from IHO Dictionary, S-32, 3339)

found by diver: the depth was determined by a person skilled in the practice of diving. (adapted from IHO Dictionary, S-32, 1422)

found by lead-line: the depth was determined by using a line, graduated with attached marks and fastened to a sounding lead. (adapted from IHO Dictionary, S-32, 2698)

swept by wire-drag: the given area was determined to be free from navigational dangers to a certain depth by towing a buoyed wire at the desired depth by two launches, or a least depth was identified using the same technique. (adapted from IHO Dictionary, S-32, 5248, 6013)

found by laser: the depth was determined by using an instrument that measures distance by emitting timed pulses of laser light and measuring the time between emission and reception of the reflected pulses. (adapted from IHO Dictionary, S-32, 2763)

swept by vertical acoustic system:
the given area has been swept using a system comprised of multiple echo sounder transducers attached to booms deployed from the survey vessel.

found by electromagnetic sensor:
the depth was determined by using an instrument that compares electromagnetic signals. (adapted from IHO Dictionary, S-32, 1571)

photogrammetry: the depth was determined by applying mathematical techniques to photographs. (adapted from IHO Dictionary, S-32, 3791)

satellite imagery: the depth was determined by using instruments placed aboard an artificial satellite. (adapted from IHO Dictionary, S-32, 4509)

found by levelling: the depth was determined by using levelling techniques to find the elevation of the point relative to a datum. (adapted from IHO Dictionary, S-32, 2741)

swept by side-scan-sonar:
the given area was determined to be free from navigational dangers to a certain depth by towing a side-scan-sonar. (adapted from IHO Dictionary, S-32, 5248, 4710) [415.2]

computer generated: the sounding was determined from a bottom model constructed using a computer.

Remarks:

No remarks.

FEATURE OBJECT ATTRIBUTES

Attribute: **Traffic flow**

Acronym: **TRAFIC** Code: **172**

Attribute type: E

Expected input:

ID Meaning

1 : inbound
2 : outbound
3 : one-way
4 : two-way

Definitions:

inbound: traffic flow in a general direction toward a port or similar destination.

outbound: traffic flow in a general direction away from a port or similar point of origin.

one-way: traffic flow in one general direction only.

two-way: traffic flow in two generally opposite directions.

References:

INT 1: IM 40;

M-4: 488;

Remarks:

No remarks.

FEATURE OBJECT ATTRIBUTES

Attribute: **Textual description**

Acronym: **TXTDSC** Code: **158**

Attribute type: S

Indication:

The string encodes the file name of an external text file that contains the text in English.

Remarks:

The attribute ‘textual description’ indicates that a file containing text extracted from relevant pilot books or navigational publications is available.

FEATURE OBJECT ATTRIBUTES

Attribute: **Vertical accuracy**

Acronym: **VERACC** Code: **180**

Attribute type: F

Expected input:

The one-dimensional error.

The error is assumed to be positive and negative. The plus/minus character shall not be encoded.

Definition:

The best estimate of the vertical accuracy of heights, vertical distances and vertical clearances, excluding sounding measurements.

Minimum value: 0

Indication:

Unit: defined in the HUNI subfield of the DSPM record or in the HUNITS attribute of the M_UNIT meta object class, e.g. metre (m)
Resolution: 0.1 m or 0.1 ft

Format:

xx.x

Example:

1.2 for an error of 1.2 metres.

Remarks:

No remarks.

FEATURE OBJECT ATTRIBUTES

Attribute: **Vertical Datum**

Acronym: **VERDAT** Code: **185**

Attribute type: E

Expected input:

ID	Meaning
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)

Definitions:

mean low water springs:
(MLWS) - the average height of the low waters of spring tides. Also called spring low water. (IHO Dictionary, S-32, 5th Edition, 3150)

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

mean sea level: (MSL) - the average height of the surface of the sea at a tide station for all stages of the tide over a 19-year period, usually determined from hourly height readings measured from a fixed predetermined reference level. (IHO Dictionary, S-32, 5th Edition, 3156)

lowest low water: an arbitrary level conforming to the lowest tide observed at a place, or some what lower. mean low water: (MLW) - the average height of all low waters at a place over a 19-year period. (IHO Dictionary, S-32, 5th Edition, 3147)

lowest low water springs:
an arbitrary level conforming to the lowest water level observed at a place at spring tides during a period of time shorter than 19 years. (Hydrographic Service, Royal Australian Navy)

approximate mean low water springs:
an arbitrary level, usually within " 0.3m from that of mean low water springs (MLWS). (Hydrographic Service, Royal Australian Navy)

Indian spring low water:(ISLW) -
an arbitrary tidal datum approximating the level of the mean of the lower low water at spring tides. Also called Indian tidal plane. (IHO Dictionary, S-32, 5th Edition, 2427)

A tidal datum approximating the lowest water level observed at a place, originated by G.H. Darwin for the tides of India at a level below MSL being equal to the sum of amplitudes of the harmonic constituents M2, S2, K1 and O1; usually below that of the lower low water at spring tides. Also called Indian tide plane. (Hydrographic Service, Royal Australian Navy).

low water springs: an arbitrary level, approximating that of mean low water springs (MLWS). (Hydrographic Service, Royal Australian Navy)

approximate lowest astronomical tide:
an arbitrary level, usually within " 0.3m from that of lowest astronomical tide (LAT). (Hydrographic Service, Royal Australian Navy)

nearly lowest low water:
an arbitrary level approximating the lowest water level observed at a place, usually equivalent to the Indian spring low water (ISLW). (Hydrographic Service, Royal Australian Navy)

mean lower low water: (MLLW) - the average height of the lower low waters at a place over a 19-year period. (IHO Dictionary, S-32, 5th Edition, 3145)

low water: an approximation of mean low water adopted as the reference level for a limited area, irrespective of better determinations at a later date. Used mostly in harbour and river engineering.

used in inland (non-tidal) waters. It is generally defined as a level which the daily mean water level would fall below less than 5% of the time and by no more than 0.2 metres during the navigation season. A single level surface is usually chosen as the low water datum for a whole lake. On a river, low water datum is a sloping surface which approximates the river surface at a low state. (Canadian Hydrographic Service)

approximate mean low water:
an arbitrary level, usually within " 0.3m from that of mean low water (MLW). (Hydrographic Service, Royal Australian Navy)

approximate mean lower low water:
an arbitrary level, usually within " 0.3m from that of mean lower low water (MLLW). (Hydrographic Service, Royal Australian Navy)

mean high water: (MHW) - the average height of all high waters at a place over a 19-year period. (IHO Dictionary, S-32, 5th Edition, 3141)

mean high water springs:
(MHWS) - the average height of the high waters of spring tides. Also called spring high water. (IHO Dictionary, S-32, 5th Edition, 3144)

high water: the highest level reached at a place by the water surface in one tidal cycle. Also called high tide. (IHO Dictionary, S-32, 5th Edition, 2251)

when used on inland (non-tidal) waters it is generally defined as a level which the daily mean water level exceeds less than 5% of the time.

approximate mean sea level:
an arbitrary level, usually within " 0.3m from that of mean sea level (MSL). (Hydrographic Service, Royal Australian Navy)

high water springs: an arbitrary level, approximating that of mean high water springs (MHWS). (Hydrographic Service, Royal Australian Navy)

mean higher high water:
(MHHW) - the average height of higher high waters at a place over a 19-year period. (IHO Dictionary, S-32, 5th Edition, 3140)

equinoctial spring low water:
the level of low water springs near the time of an equinox.

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

local datum: an arbitrary datum defined by a local harbour authority, from which levels and tidal heights are measured by this authority.

international great lakes datum 1985:
(IGLD 1985) - a vertical reference system with its zero based on the mean water level at Rimouski/Pointe-au-Père, Quebec, over the period 1970 to 1988.

mean water level: the average of all hourly water levels over the available period of record.

lower low water large tide:
(LLWLT) - the average of the lowest low waters, one from each of 19 years of observations.

higher high water large tide:
(HHWLT) - the average of the highest high waters, one from each of 19 years of observations.

nearly highest high water:
an arbitrary level approximating the highest water level observed at a place, usually equivalent to the high water springs.

highest astronomical tide:

(HAT) the highest tidal level which can be predicted to occur under average meteorological conditions and under any combination of astronomical conditions. (IHO Dictionary, S-32, 5th Edition, 2244).

Remarks:

This attribute is used to specify the datum to which both heights (vertical datum, see S-57 Part 3) and soundings (sounding datum, see S-57 Part 3) are referred.

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2.3 National Language Attributes

NATIONAL LANGUAGE ATTRIBUTES

Attribute: **Information in national language**

Acronym: **NINFOM** Code: **300**

Attribute type: S

References:

INT 1: IA 16;

M-4: 242.35;

Indication:

Text (c...): Textual information in national language characters

Format:

c...

Remarks:

The attribute ‘information in national language’ encodes any textual information about an object using a specified national language.

The textual information could be, for example, a list, a table or a text.

This attribute should be used, for example, to hold the information that is shown on paper charts by cautionary and explanatory notes.

NATIONAL LANGUAGE ATTRIBUTES

Attribute: **Object name in national language**

Acronym: **NOBJNM** Code: **301**

Attribute type: S

References:

INT 1: ID 7, IF 19, IN 12.23;

M-4: 371; 323.12; 431.23; 431.5;

Indication:

Name of object (c...):string of national language characters

Format:

c...

Remarks:

The attribute ‘object name in national language’ encodes the individual name of an object in the specified national language.

NATIONAL LANGUAGE ATTRIBUTES

Attribute: **Textual description in national language**

Acronym: **NTXTDS** Code: **304**

Attribute type: S

Indication:

the string encodes the file name of an external text file that contains the text in a national language.

Remarks:

The attribute ‘textual description in national language’ indicates whether a text file containing text extracted from relevant pilot books or navigational publications is available.

2.4 Spatial and Meta Object Attributes

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

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

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

SPATIAL AND META OBJECT ATTRIBUTES

Attribute: **Positional Accuracy**

Acronym: **POSACC** Code: **401**

Attribute type: F

Expected input:

The expected input is the maximum of the two-dimensional error.

The error is assumed to be positive and negative. The plus/minus character shall not be encoded.

Definition:

The best estimate of the accuracy of a position.

Minimum value: 0

Indication:

Unit:	defined in the PUNI subfield of the DSPM record, e.g. metre (m)
Resolution:	0.1 m or 0.1 mm

Format:

xxxx.x

Example:

25	for an error of 25 metres.

Remarks

No remarks

SPATIAL AND META OBJECT ATTRIBUTES

Attribute: **Quality of position**

Acronym: **QUAPOS** Code: **402**

Attribute type: E

Expected input:

ID		Meaning	INT 1	M-4
1	:	surveyed	IC 1;	310.1;
2	:	unsurveyed	IC 2; II 25;	311; 410;
3	:	inadequately surveyed	II 25;	410;
4	:	approximate	IB 7, 33; IC 12; II 31;	305.1; 351.4; 411.2;
5	:	position doubtful	II 1;	424.3;
6	:	unreliable		
7	:	reported (not surveyed)		
8	:	reported (not confirmed)	II 3.1-2, 4;	
9	:	estimated		
10	:	precisely known		
11	:	calculated		

Definitions:

surveyed: the position(s) was(were) determined by the operation of making measurements for determining the relative position of points on, above or beneath the earth's surface. Survey implies a regular, controlled survey of any date. (adapted from IHO Dictionary, S-32, 5195, & IHO Chart Specifications, M-4, 175.2)

unsurveyed: survey data is does not exist or is very poor. (adapted from IHO Dictionary, S-32, 5732)

inadequately surveyed: position data is of a very poor quality. (adapted from IHO Dictionary, S-32, 5732)

approximate: a position that is considered to be less than third-order accuracy, but is generally considered to be within 30.5 metres of its correct geographic location. Also may apply to an object whose position does not remain fixed. (adapted from IHO Dictionary, S-32, 213, 3967, & IHO Specifications, M-4, 424.1)

position doubtful: an object whose position has been reported but which is considered to be doubtful.

unreliable: an object's position obtained from questionable or unreliable data.

reported (not surveyed): an object whose position has been reported and its position confirmed by some means other than a formal survey such as an independent report of the same object.

reported (not confirmed): an object whose position has been reported and its position has not been confirmed.

estimated:	the most probable position of an object determined from incomplete data or data of questionable accuracy. (adapted from IHO Dictionary, S-32, 3960)
precisely known:	a position that is of a known value, such as the position of an anchor berth or other defined object.
calculated:	a position that is computed from data.

Remarks:

No remarks.