11th Meeting of the IHO (S-100WG) S-101 Project Team

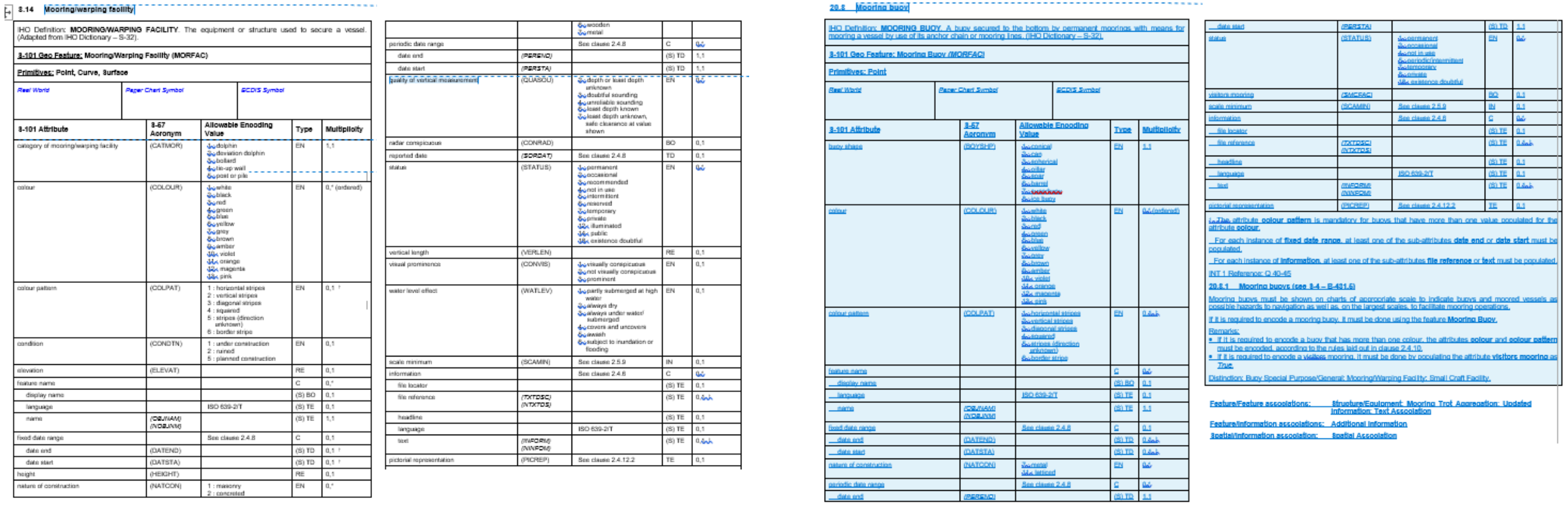
Modelling Mooring/Warping Facilities in S-101

Agenda Item 08.11

S-101PT11, Lombok, Indonesia, 27-29 September 2023

RELATED DOCUMENTS/DISCUSSIONS

- S-101PT10_2023_07.5_EN_Mooring_Warping_Facility_in_S-101_V2 (Actions S-101PT10-18, 19, 20).
- S-101 Documentation and FC GitHub Issue #82.
- S-101 DCEG, Draft Edition 1.2.0 (clauses 8.14, 14.2 and 20.8 (new).



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
category of mooring/warping facility	(CATMOR)	dolphin dowsken dolphin bollard tie-up wall post or pile	EN	1,1
colour	(COLOUR)	white black red green blue yellow grey brown amber violet orange magenta pink	EN	0,* (ordered)
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,*
display name			(S) BO	0,1
language		ISO 639-2/T	(S) TE	0,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
height	(HEIGHT)		RE	0,1
nature of construction	(NATCON)	1 : masonry 2 : concreted	EN	0,*
		wooden metal		
periodic date range		See clause 2.4.8	C	0,1
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
quality of vertical measurement	(QUASOU)	depth or least depth unknown doubtful sounding unreliable sounding least depth known least depth unknown, safe clearance at value shown	EN	0,1
radar conspicuous	(CONRAD)		BO	0,1
reported date	(SORDAT)	See clause 2.4.8	TD	0,1
status	(STATUS)	permanent occasional recommended not in use intermittent reserved temporary private illuminated public existence doubtful	EN	0,1
vertical length	(VERLEN)		RE	0,1
visual prominence	(CONVIS)	visually conspicuous not visually conspicuous prominent	EN	0,1
water level effect	(WATLEV)	partly submerged at high water always dry always under water/ submerged covers and uncovers awash subject to inundation or flooding	EN	0,1
scale minimum	(SCAMIN)	See clause 2.5.9	IN	0,1
information		See clause 2.4.8	C	0,1
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	0,1
text	(INFORM) (NINFOM)		(S) TE	0,1
pictorial representation	(PICREP)	See clause 2.4.12.2	TE	0,1

20.8 Mooring buoy

IHO Definition: **MOORING BUOY**. A buoy secured to the bottom by permanent moorings with means for mooring a vessel by use of its anchor chain or mooring lines. (IHO Dictionary – S-32).

S-101 Geo Feature: Mooring Buoy (MORFAC)

Primitives: Point

Real World	Paper Chart Symbol	ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
buoy shape	(BOYSHP)	conical spar spherical pillar spar barrel ~~can buoy~~ super buoy	EN	1,1
colour	(COLOUR)	white black red green blue yellow grey brown amber violet orange magenta pink	EN	0,4 (ordered)
colour pattern	(COLPAT)	horizontal stripes vertical stripes diagonal stripes squared stripes (direction unknown) border stripe	EN	0,1 †
feature name			C	0,*
display name			(S) BO	0,1
language		ISO 639-2/T	(S) TE	0,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
nature of construction	(NATCON)	metal lattice	EN	0,*
periodic date range		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
status	(STATUS)	permanent occasional not in use periodic/intermittent temporary reserved existence doubtful	EN	0,*
visitors mooring	(SMCFACI)		BO	0,1
scale minimum	(SCAMIN)	See clause 2.5.9	IN	0,1
information		See clause 2.4.8	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	0,1
text	(INFORM) (NINFOM)		(S) TE	0,1 †
pictorial representation	(PICREP)	See clause 2.4.12.2	TE	0,1

The attribute **colour pattern** is mandatory for buoys that have more than one value populated for the attribute **colour**.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

INT 1 Reference: O 40–45

20.8.1 Mooring buoys (see 8-4 – P-431.5)

Mooring buoys must be shown on charts of appropriate scale to indicate buoys and moored vessels as possible hazards to navigation as well as on the largest scales, to facilitate mooring operations.

If it is required to encode a mooring buoy, it must be done using the feature **Mooring Buoy**.

Remarks:

- If it is required to encode a buoy that has more than one colour, the attributes **colour** and **colour pattern** must be encoded, according to the rules laid out in clause 2.4.10.
- If it is required to encode a visitors mooring, it must be done by populating the attribute **visitors mooring** as True.

Distinction: Buoy Special Purpose/General; Mooring/Warping Facility; Small Craft Facility.

Feature/Feature associations: Structure/Equipment: Mooring Trot Aggregation; Updated Information; Text Association

Feature/Information associations: Additional Information

Spatial/Information association: Spatial Association

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IHO PROPOSALS

International Hydrographic Organization

- Summarised in GitHub Issue #82 (based on re-modelling attribute categoryOfMooringWarpingFacility):

Code	Label	Definition	Primitives	Comments	IHO Sec Comments
1	Dolphin	A post or group of posts, used for mooring or warping a vessel, or as an aid to navigation. The dolphin may be in the water, on a wharf or on the beach.	Point/Surface	Create new feature Dolphin. Potential for OCIMF definition to be used..."An independent platform incorporating mooring hooks or bollards for securing ship's mooring lines"	Agree with new feature, however note that the current definition is the Hydrographic Dictionary definition, therefore any proposed amendment will need to be approved by HDWG.
2	Deviation Dolphin	A post or group of posts, which a vessel may swing around for compass adjustment.	Point/Surface	Create new feature Dolphin and use a Boolean attribute to indicate deviation Dolphins. .	Agree.
3	Bollard	Small shaped post, mounted on a wharf or dolphin used to secure ship's lines.	Point, Surface	Propose create a dedicated feature this would allow an attribute for Safe Working Loadto be included. Elevation as present on MORFAC should be retained. An attribute for identification should be included.	Agree.
4	Tie-Up Wall	A section of wall designated for tying-up vessels awaiting transit. Bollards and mooring devices are available for both large and small ships.	Curve/Surface	Shore line construction includes categories of various walls, fender and landing steps. Propose making this a category of shoreline construction.	Would normally not agree, however I think a precedent has been set with already allowable categoryOfShorelineConstruction = *14* (fender). Therefore happy to accept.
5	Post or Pile	A long heavy timber or section of steel, wood, concrete, etc., forced into the seabed to serve as a mooring facility.	Point	Pile already exists as an S-101 feature, add additional value for Category of Pile.	Tend to agree. Add new value for "mooring post/pile"?
6	Mooring Cable	A chain or very strong fibre or wire rope used to anchor or moor vessels or buoys.	Curve	Submarine Cable also has a category of mooring cable (6). Propose map any instances to that feature in S-101.	Agree. Done in response to Action S-101PT10-17. See S-101 Documentation and FC GitHub Issue #83.
7	Mooring Buoy	A buoy secured to the bottom by permanent moorings with means for mooring a vessel by use of its anchor chain or mooring lines.	Point	Propose making a specific Mooring Buoy feature with the relevant attributes.	See Action S-101PT10-18 and S-101 Documentation and FC GitHub Issue #81. The decision to essentially deconstruct the MooringWarpingFacility feature as
					suggested above is based on this S-101PT10 decision.

If all recommendations as summarized in this Table are approved, the S-101 feature **Mooring/Warping Facility** can be removed from S-101.

ENC conversion guidance (S-65 Annexes B and C) will need to be amended accordingly.

RECOMMENDATION (DOLPHINS)

- categoryOfMooringWarpingFacility = *1* (dolphin) and *2* (deviation dolphin).
  - Suggest dedicated feature **Dolphin**.
  - Definition has been retained (derived from IHO Hydrographic Dictionary). Should this definition be reviewed (proposal contains definition from OCIMF (Oil Companies International Mrine Forum)?
  - Suggest geometric primitive point and surface (surface TBD).
  - Noting comment from Port of Rotterdam in the GitHub, suggest a new enumerate type attribute **category of dolphin** (original proposal was for a Boolean attribute for deviation dolphins). Values for this attribute to be confirmed.
  - Allowable values for attribute **water level effect** to be confirmed.

Further email feedback from Netherlands (requirements for Port of Rotterdam):

In reaction on [the] Paper for Consideration, I do have some remarks.

- 1 & 2 Dolphin: Creating a new feature Dolphin is a good approach. Consider adding an attribute Category of Dolphin: 1) Mooring Dolphin 2) Fender/breasting Dolphin 3) Deviation Dolphin etc.

The distinction between a Dolphin used for the Lines and those used for breasting is the main issue for POR. The terminology and definitions is also something to look at because there's quite some confusion in place.

RECOMMENDATION (DOLPHINS) (2)

International Hydrographic Organization

8.X Dolphin

IHO Definition: **DOLPHIN**. A post or group of posts, used for mooring or warping a vessel, or as an aid to navigation. The dolphin may be in the water, on a wharf or on the beach. (Adapted from IHO Dictionary – S-32).

S-101 Geo Feature: Dolphin *(MORFAC)*

Primitives: Point, Surface

Real World	*Paper Chart Symbol*	*ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of dolphin	*(CATMOR)*	1: mooring dolphin 2: deviation dolphin 3: berthing dolphin 4: fender/breasting dolphin	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,* (ordered)
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,*
display name			(S) BO	0,1
language		ISO 639-2/T	(S) TE	0,1
name	*(OBJNAM)* *(NOBJNM)*		(S) TE	1,1
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
height	(HEIGHT)		RE	0,1
nature of construction	(NATCON)	1: masonry 2: concreted 6: wooden 7: metal	EN	0,*
periodic date range		See clause 2.4.8	C	0,*
date end	*(PEREND)*		(S) TD	1,1
date start	*(PERSTA)*		(S) TD	1,1
radar conspicuous	(CONRAD)		BO	0,1
reported date	*(SORDAT)*	See clause 2.4.8	TD	0,1
status	(STATUS)	1: permanent 2: occasional 3: recommended 4: not in use 5: intermittent 6: reserved 7: temporary 8: private 12: illuminated 14: public 18: existence doubtful	EN	0,*
vertical length	(VERLEN)		RE	0,1
visual prominence	(CONVIS)	1: visually conspicuous 2: not visually conspicuous 3: prominent	EN	0,1
water level effect	(WATLEV)	1: partly submerged at high water 2: always dry 4: covers and uncovers	EN	0,1
scale minimum	(SCAMIN)	See clause 2.5.9	IN	0,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	*(TXTDSC)* *(NTXTDS)*		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	0,1
text	*(INFORM)* *(NINFOM)*		(S) TE	0,1 †
pictorial representation	(PICREP)	See clause 2.4.12.2	TE	0,1

† The attribute **colour pattern** is mandatory for mooring/warping facilities that have more than one value populated for the attribute **colour**.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

INT 1 Reference: F 20,21

8.X.1 Dolphins (see S-4 – B-327.1-2)

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

Remarks:

- None.

Distinction: Beacon Special Purpose/General; Buoy Special Purpose/General; Pile; Shoreline Construction.

Feature/Feature associations: **Structure/Equipment**; **Aids to Navigation Association**; **Range System Aggregation**; **Updated Information**; **Text Association**

Feature/Information associations: **Additional Information**

RECOMMENDATION (BOLLARDS)

- categoryOfMooringWarpingFacility = *3* (bollard).
  - Suggest dedicated feature **Bollard**. NOTE: S-4 – B-427.4 states that bollards "… are not generally charted", however was included in S-57 (presumably for "Berthing" Navigational Purpose (6) ENCs).
  - Definition has been retained (taken directly from IHO Hydrographic Dictionary).
  - Suggest geometric primitive point only.
  - Include one of attributes **elevation** or **height**; or both?
  - Noting comment from proposer related to encoding an identifier, have chosen to include guidance to populate this using complex attribute **feature name**.
  - A new attribute **safe working load** has been added, however note that research indicates that this could also be named **working load limit** (preferred option TBD). Note that units for this attribute have been quoted as pound-force as identified during research. Need to determine if this is the standard unit used in terms of shipping. [Additional note: if this attribute is approved, should it also be considered for inclusion on the feature **Crane**?]

RECOMMENDATION (BOLLARDS) (2)

International Hydrographic Organization

8.X Bollard

IHO Definition: **BOLLARD**. Small shaped post, mounted on a wharf or dolphin used to secure ship's lines. (IHO Dictionary – S-32).

S-101 Geo Feature: Bollard *(MORFAC)*

Primitives: Point

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
elevation	(ELEVAT)		RE	0,1
feature name			C	0,*
display name			(S) BO	0,1
language		ISO 639-2/T	(S) TE	0,1
name	*(OBJNAM)* *(NOBJNM)*		(S) TE	1,1
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1†
date start	(DATSTA)		(S) TD	0,1†
periodic date range		See clause 2.4.8	C	0,*
date end	*(PEREND)*		(S) TD	1,1
date start	*(PERSTA)*		(S) TD	1,1
reported date	*(SORDAT)*	See clause 2.4.8	TD	0,1
safe working load			IN	0,1
status	(STATUS)	1: permanent 3: recommended 4: not in use 6: reserved 7: temporary 8: private 12: illuminated 14: public 18: existence doubtful	EN	0,*
scale minimum	(SCAMIN)	See clause 2.5.9	IN	0,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	*(TXTDSC)* *(NTXTDS)*		(S) TE	0,1†
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	0,1
text	*(INFORM)* *(NINFOM)*		(S) TE	0,1†
pictorial representation	(PICREP)	See clause 2.4.12.2	TE	0,1

† For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

INT 1 Reference:

8.X.1 Bollards (see S-4 – B-327.4)

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

Remarks:

- The identifier of designator for a bollard must be encoded, where required, using the complex attribute **feature name**.
- Bollards should be associated to the feature on which they are mounted using the association **Structure/Equipment** (see clause 25.15).

Distinction: Pile; Shoreline Construction.

Feature/Feature associations: **Structure/Equipment**; **Updated Information**; **Text Association**

Feature/Information associations: **Additional Information**

Spatial/Information association: **Spatial Association**

27.XXX safe working load

IHO Definition: **SAFE WORKING LOAD**. The maximum safe force that a piece of lifting equipment, lifting device or accessory can exert to lift, suspend, or lower, a given mass without fear of breaking. (Wikipedia).

Attribute Type: Integer

Unit: Pound-Force (lbf)

Resolution: 1 lbf

Format: xxxx

Example: **2000** for a safe working load of 2000 lbf

Remarks:

- No remarks.

RECOMMENDATION (TIE UP WALL)

International Hydrographic Organization

- categoryOfMooringWarpingFacility = *4* (tie up wall).
  - Suggest new value *23* for attribute **category of shoreline construction**.

27.62 category of shoreline construction (CATSLC)

IHO Definition: **CATEGORY OF SHORELINE CONSTRUCTION**. Classification of shoreline construction based on use.

Attribute Type: Enumeration

1) **breakwater**

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

2) **groyne**

   IHO Definition: A low artificial wall-like structure of durable material extending from the land to seaward for a particular purpose, such as to protect the coast or to force a current to scour a channel. (IHO Dictionary – S-32).

3) **mole**

   IHO Definition: A form of breakwater alongside which vessels may lie on the sheltered side only; in some cases it may lie entirely within an artificial harbour, permitting vessels to lie along both sides. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.84, November 2000).

4) **pier (jetty)**

   IHO Definition: A long, narrow structure extending into the water to afford a berthing place for vessels, to serve as a promenade, etc. (IHO Dictionary – S-32).

⋮

22) **quay**

   IHO Definition: A wharf approximately parallel to the shoreline and accommodating ships on one side only, the other side being attached to the shore. It is usually of solid construction, as contrasted with the open pile construction usually used for piers. (IHO Dictionary – S-32).

23) **tie up wall**

   IHO Definition: A section of wall designated for tying-up vessels awaiting transit. Bollards and mooring devices are available for both large and small ships. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

Remarks:
- No remarks.

RECOMMENDATION (POST OR PILE)

- categoryOfMooringWarpingFacility = *5* (post or pile).
  - Suggest new value *8* for attribute **category of pile**. Note however comment from Port of Rotterdam:
    - 5 Post or pile: I think it would be beneficial if a PILPNT remain as is and not as a mooring facility. We would commonly use a PILPNT for a post which is not used for mooring, as a lights support or purpose unknown.

27.46 category of pile (CATPLE)

IHO Definition: **CATEGORY OF PILE**. Classification of pile, driven into the earth as a foundation or support for a structure.

Attribute Type: Enumeration

1) **stake**

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

3) **post**

   IHO Definition: A vertical piece of timber, metal or concrete forced into the earth or seabed. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

4) **tripodal**

   IHO Definition: A single structure comprising 3 or more piles held together (sections of heavy timber, steel or concrete), and forced into the earth or seabed. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.61, November 2000).

5) **piling**

   IHO Definition: A number of piles, usually in a straight line, and usually connected or bolted together. (Adapted from IHO Dictionary – S-32).

6) **area of piles**

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

7) **pipe**

   IHO Definition: A vertical hollow cylinder of metal, wood, or other material forced into the earth or seabed. (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.61, November 2000).

8) **mooring post**

   IHO Definition: A post where to which something (such as a craft) can be moored. (Adapted from Merriam-Webster Dictionary – 2023).

Remarks:

- No remarks.

RECOMMENDATION (MOORING CABLE) (ACTION S-101PT10-17)

International Hydrographic Organization

- categoryOfMooringWarpingFacility = *6* (mooring cable).
  - Suggest amend mapping to attribute **category of cable** value *6* (mooring cable).
  - Note also new value for **category of cable** of *9* (junction cable) for mooring trots.

27.12 category of cable (CATCBL)

IHO Definition: **CATEGORY OF CABLE**. Classification of the cable based on the services provided.

Attribute Type: Enumeration

1) **power line**

   IHO Definition: A cable that transmits or distributes electrical power. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

3) **transmission line**

   IHO Definition: Multiple un-insulated cables usually supported by steel lattice towers. Such features are generally more prominent than normal power lines. (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.16, November 2000).

4) **telephone**

   IHO Definition: A cable that transmits telephone signals. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2010).

5) **telegraph**

   IHO Definition: An apparatus, system or process for communication at a distance by electric transmission over wire. (IHO Nautical Information Provision Working Group, 2017).

6) **mooring cable**

   IHO Definition: A chain or very strong fibre or wire rope used to anchor or moor vessels or buoys. (IHO Dictionary – S-32).

7) **ferry**

   IHO Definition: A vessel for transporting passengers, vehicles, and/or goods across a stretch of water, especially as a regular service. (Defence Geospatial Information Working Group; Feature Data Dictionary Register, 2016).

   A ferry cable is a cable or chain used to facilitate the movement of a ferry.

8) **fibre optic cable**

   IHO Definition: A cable made of glass or plastic fibre designed to guide light along its length. Fibre optic cables are widely used in fibre-optic communication, which permits transmission over longer distances and at higher data rates than other forms of communication.

9) **junction cable**

   IHO Definition: A cable used for joining components of complex marine structures, for example mooring trots.

Remarks:

- No remarks.

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

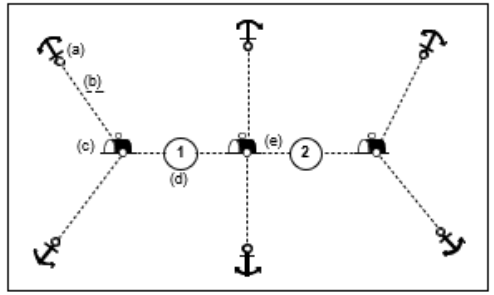


Figure 8-2 – Mooring trot

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 Figure 8-2 above:

(a) Ground tackle should be encoded using **Obstruction** features (see clause 13.6), with attribute **category of obstruction** = *9* (ground tackle).
(b) Mooring cables should be encoded using **Cable Submarine** features (see clause 14.2), with attribute **category of cable** = *6* (mooring cable).
(c) Buoys should be encoded using **Mooring Buoy** features.
(d) Mooring berths should be encoded using **Berth** features.
(e) Junction cables should be encoded using **Cable Submarine** features, with attribute **category of cable** = *9* (junction cable).

All these features should be aggregated in a **Mooring Trot** feature, using the association **Mooring Trot Aggregation** (see clause 25.10), with the name of the mooring trot being populated using the complex attribute **feature name** for the **Mooring Trot**.

Remarks:

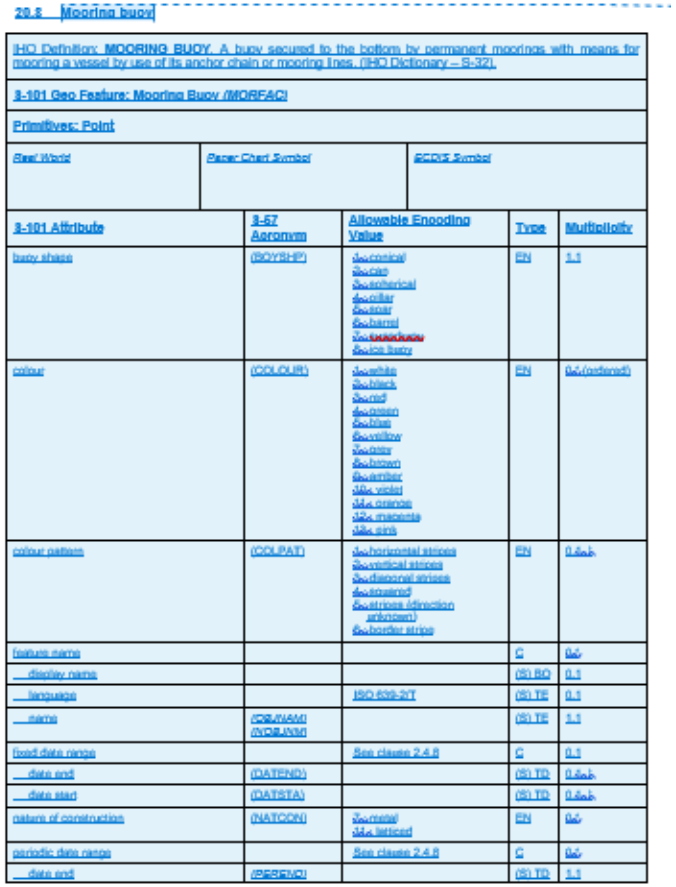
- If it is required to encode the name of a mooring trot, the **Mooring Trot** should be encoded using geometry of type surface. The extent of the surface should cover the extent of all the components of the mooring trot.
- If it is required to encode the extent of an unnamed mooring trot, this may be done using a **Mooring Trot** feature having no geometry.
- Names or numbers of individual moorings within the mooring trot must be encoded using the attribute **feature name** on the relevant **Berth** feature.

Distinction: Berth; Mooring/Warping Facility.

RECOMMENDATION (MOORING BUOY) (ACTION S-101PT10-18)

International Hydrographic Organization

- categoryOfMooringWarpingFacility = *7* (mooring buoy).
  - In accordance with decision from S-101PT10 and Action S-101PT10-18, has been remodelled as new feature **Mooring Buoy**.



20.8 Mooring buoy

IHO Definition: **MOORING BUOY**. A buoy secured to the bottom by permanent moorings with means for mooring a vessel by use of its anchor chain or mooring lines. (IHO Dictionary – S-32)

S-101 Geo Feature: Mooring Buoy (MORFAC)

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 2 can 3 spherical 4 pillar 5 spar 6 barrel 7 ~~super buoy~~ 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	0,n (ordered)
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,n
display name			(M) BO	0,1
language		ISO 639-2/T	(M) TE	0,1
name	(OBJNAM) (NOBJNM)		(M) TE	1,1
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(M) TD	0,1
date start	(DATSTA)		(M) TD	0,1
nature of construction	(NATCON)	1 masonry 2 concrete 3 metal 4 lattice	EN	0,n
periodic date range		See clause 2.4.8	C	0,n
date end	(PEREND)		(M) TD	1,1
date start	(PERSTA)		(M) TD	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 10 existence doubtful	EN	0,n
visitors mooring	(SMCFAC)		BO	0,1
scale minimum	(SCAMIN)		IN	0,1
information		See clause 2.4.8	C	0,n
file locator			(M) TE	0,1
file reference	(PICREP) (NTXTDS)		(M) TE	0,n
headline			(M) TE	0,1
language		ISO 639-2/T	(M) TE	0,1
text	(INFORM) (NINFOM)		(M) TE	0,n
pictorial representation	(PICREP)	See clause 2.4.12.2	TE	0,1

1 The attribute **colour pattern** is mandatory for buoys that have more than one value populated for the attribute **colour**.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

INT 1 Reference: O 40-45

20.8.1 Mooring buoys (see S-4 – B-431.6)

Mooring buoys must be shown on charts of appropriate scale to indicate buoys and moored vessels as possible hazards to navigation as well as, on the largest scales, to facilitate mooring operations.

If it is required to encode a mooring buoy, it must be done using the feature **Mooring Buoy**.

Remarks:

- If it is required to encode a buoy that has more than one colour, the attributes **colour** and **colour pattern** must be encoded, according to the rules laid out in clause 2.4.10.
- If it is required to encode a visitors mooring, it must be done by populating the attribute **visitors mooring** as True.

Distinction: Buoy Special Purpose/General; Mooring/Warping Facility; Small Craft Facility.

Feature/Feature associations: Structure/Equipment; Mooring Trot Aggregation; Updated Information; Text Association

Feature/Information associations: Additional Information

Spatial/Information association: Spatial Association

POSSIBLE ALTERNATIVE RECOMMENDATION

- Retain existing **Mooring/Warping Facility** feature, with removal of attribute **category of mooring/warping facility** values *6* (mooring cable) and *7* (mooring buoy) only.
  - Decision to be based on the fundamental question: How much detail is to be included in the navigational ENC?

ACTIONS REQUESTED OF S-101PT

- **Discuss** the recommendations included in this presentation.
- **Agree** on required changes to S-101 documentation for inclusion in Edition 1.2.0.
- **Initiate** further action as required.

IHO

International Hydrographic Organization

THANK YOU