Guidelines for Harmonized Communication

and

Electronic Exchange

of

Nautical Data for Port Calls©

Version 2.1

Document revision history

1.0	20/04/22	Content of Port Information Manual 3.02, aligned with chapters of IMO BLU Code and aligned with IHO standards
1.1	17/05/22	Review of IHO NIPWG processed for definitions
1.2	10/06/22	Review of IHO NIPWG processed for units of measurement
1.3	31/01/23	Review for submission to IMO FAL 46/INF.3
1.4	21/08/23	Based on Guide for Nautical Data 1.3 (ports)
		Based on IMO BLU Code, IMO Resolution A.862(20) (bulk)
		Based on OCIMF MTPQ (tanker)
		Based on Port Memo (container)
		Focus on "nautical information necessary for safe navigation" as per SOLAS
		Focus on data elements that serve the S-57 Electronic Navigational Charts
		Aligned with IMO FAL "Guidelines For Harmonized Communication And Electronic Exchange Of Operational Data For Port Calls"
		Validated with IHO standards through IHO NIPWG
1.5	14/09/23	Processed input IHO NIPWG meeting in Monaco
		Processed input IAPH DCC meeting
1.6	16/10/23	Naming of document changed to align with IMO FAL "Guidelines For Harmonized Communication And Electronic Exchange Of Operational Data For Port Calls"
1.7	15/12/23	Logos of document changed based on feedback IHO, IMO
		Custodian body International Taskforce Port Call Optimization
		Focus on IHO S-57
		Focus on IMO A.862(20)
		Per chapter data ownership
		Per chapter data exchange through API if available
1.8	02/01/24	Document for approval by IHO NIPWG March 2024, focus on S-57 ENC
1.9	31/01/24	Processed all feedback of ITPCO meeting 17/01/24
2.0	08/02/24	Processed all feedback of Netherlands Hydrographic Office
2.1	07/08/24	Processed all feedback of meeting with NIPWG Chair in London

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Table of contents

1 Preamble

1.1 These guidelines are intended to provide guidance to the implementation of an electronic and automated exchange of nautical data between ports, hydrographic services and back office services.

1.2 These guidelines will make reference to the IHO standards and other specifications where relevant.

1.3 These guidelines will help ports and hydrographic offices to demonstrate that they're working together to discharge their collective responsibilities for SOLAS as per Chapter V Regulation 9: "Contracting Governments undertake to arrange for the collection and compilation of hydrographic data and the publication, dissemination and keeping up to date of all nautical information necessary for safe navigation".

1.4 These guidelines will help ports and terminals to demonstrate that they are a "safe port" in the context of the Charter Party: "A port will not be safe unless, in the relevant period of time, the particular vessel can reach it, use it and return from it without, in the absence of some abnormal occurrence, being exposed to danger which cannot be avoided by good navigation and seamanship".

1.5 These guidelines will ensure consistency of approach for chartering, planning, port admission policy and navigation of vessels using agreed data format and presentation. The importance is that in case of accidents in court the data in the nautical chart is leading

1.7 The IHO has supported the search for best matching standards, thus ensuring harmonization between hydrographic offices and the industry.

1.8 These guidelines will not be disseminated until the formal endorsement of the IHO Nautical Information Provision Working Group (NIPWG) has been received.

2 Abbreviations

BIMCO	The world's largest direct-membership organisation for shipowners, charterers, shipbrokers, and agents
ECDIS	Electronic Chart Display Information System
ENC	Electronic Navigational Chart
FAL	Convention Facilitation of International Maritime Traffic
HD ENC	High Density ENC
HO	Hydrographic Office
IAPH	International Association of Ports and Harbours
IBTA	International Bulk Terminals Association
ICS	International Chamber of Shipping
IHMA	International Harbour Master's Association
IHO	International Hydrographic Organization
IMO	International Maritime Organization
INTERCARGO	International Association of Dry Cargo Shipowners
ITPCO	International Taskforce Port Call Optimization
MTIS	Marine Terminal Information System
OCIMF	Oil Companies International Marine Forum
RENC	Regional Electronic Navigational Chart Coordination Center
UKC	Under Keel Clearance
UKHO	United Kingdom Hydrographic Office
VAR	Value Added Resellers

3 Nautical data as part of the port call process

3.1 The port call process is based on a high-level business process of port calls, which is based on IMO regulations, BIMCO contracts, and requirements of port authorities and other stakeholders, making it a port and trade agnostic process. It has been created by the Industry (a group of leading ports and shipping lines) and validated during Industry Roundtable sessions organized by the IMO Global Industry Alliance (GIA) to Support Low Carbon Shipping. It has been used as such in the "Guidelines for setting up a Maritime Single Window", IMO FAL 46/5/1.

The port call process and an explanatory appendix can be downloaded from www.portcalloptimization.org
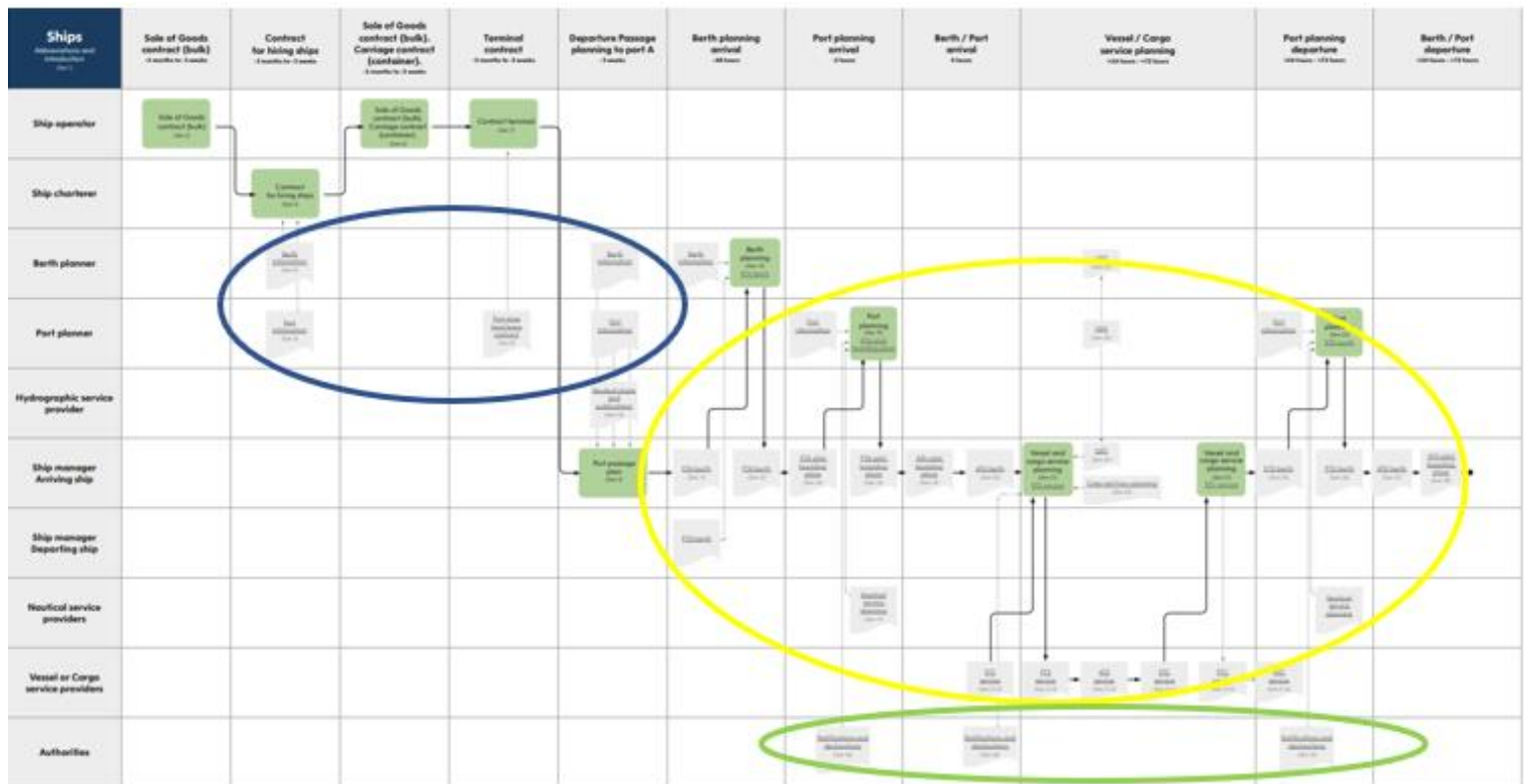
3.2 The data to be exchanged as part of the port call process includes the following:

3.2.1 Nautical data - blue

Data that is provided by hydrographic offices in Navigational Charts, Nautical Publications or coast pilots, and tide tables. Additionally, nautical data is used in the maritime industry for chartering, planning and admission policy purposes.

3.2.2 Administrative data - green

Data that is submitted by ships or other non-authority parties to authorities in notifications and declarations. Refer to Guide for Administrative data, FAL 5-Circ.42-Rev 2 published by IMO.

3.2.3 Operational data - yellow

Data that is submitted to non-authority parties as part of planning or execution of certain operations. Refer to IMO FAL Guidelines for Harmonized Communication And Electronic Exchange Of Operational Data For Port Calls published by IMO.

3.3 Nautical data in the business process

From the business process one can identify that nautical data is used for multiple purposes:
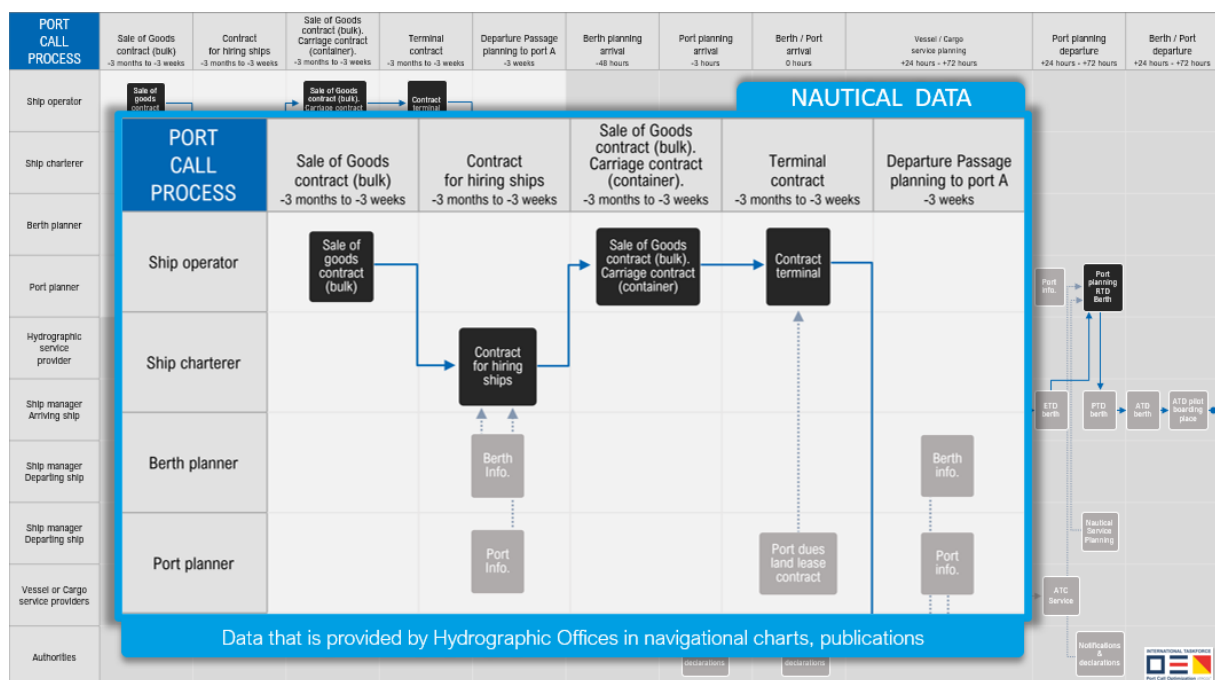
3.3.1 For chartering and planning

The risk of a port or berth being unsafe is very often primarily for the Charterer. Based on a series of court judgements under common law, a widely accepted legal definition of a(n) (un)safe port under common law is the following: "A port will not be safe unless, in the relevant period of time, the particular vessel can reach it, use it and return from it without, in the absence of some abnormal occurrence, being exposed to danger which cannot be avoided by good navigation and seamanship".

The Charterer uses shore-based databases and applications to select ships and make a ship-berth compatibility check. Therefore, having robust, globally unique identifiers for both the ship and the berth are crucial in this part of the process.

These databases and applications may collect their data about twice per year through e.g., but not limited to, agents, terminals, surveyors. However, these parties do not have an obligation to provide such data, nor is the accuracy of data verifiable. The standards used are often trade specific (e.g., the bulk segment uses different standards than the tanker segment).

3.3.2 For port admission policy

The port admission policy is based on the port's data and used on a daily basis to grant approval for arriving and departing vessels. Daily use of the same data in operations makes the data very reliable, as incorrect data will be noticed by operational people.

3.3.3 For navigation

A Master is responsible for making a voyage plan from berth to berth as per IMO Resolution A.893(21): "detailed planning of the whole voyage or passage from berth to berth". The Master can only use Nautical Charts (Electronic Navigational Charts, so called ENC's) and Nautical Publications which are issued by, or on the authority of a Government-authorized hydrographic office or other relevant government institution. Only these publications fulfill the SOLAS carriage requirements.

A special form of an ENC is the High-Density bathymetry (HD ENC); a special ENC with more bathymetric content compared to ENC, not (yet) available to the Master, but used by e.g., local pilots.

These Nautical Charts and Publications are kept up to date by the "Contracting Government" as per SOLAS Chapter V Regulation 9: "Contracting Governments undertake to arrange for the collection and compilation of hydrographic data and the publication, dissemination and keeping up to date of all nautical information necessary for safe navigation".

Most hydrographic offices collect their data from ports, depending on when new data becomes available. Hydrographic offices of the IHO Nautical Information Provision Working Group experience a lack of data availability and consistency by ports, resulting in HO's being unwilling to publish port infrastructure data in their charts and publications as they cannot guarantee the correctness of the data. Ports in their turn face difficulties gathering data from all data owners in the port, as the port is not the data owner of all port data. E.g., terminals may be the data owner of the soundings of the berth pocket. In addition, ports do not always have the mandate nor the resources to organize the collection and dissemination of nautical data. Terminals again in their turn feel reluctant to provide data about the berth approach, as it's normally the responsibility of the port.

3.3.3 For chartering, planning, port admission policy and navigation

As data for chartering, planning, port admission policy and navigation is collected from different parties, at different times and with different standards, it is inevitable that the same ship is chartered, planned, permitted and navigated based on different data sets.

Therefore, efforts should be made that ports and hydrographic offices start using consistent standards, and consequently a minimum set of nautical data for safe navigation becomes available for chartering, planning, port admission policy and navigating the same ship berth to berth based on this agreed data format and presentation.

4 Nautical data standards

4.1 As shipping operates from port to port worldwide, the standards need to be accepted and respected by all ports globally (i.e. the standards need to be port agnostic).

4.2 As ports facilitate all types of trades (tanker, bulk, container, ro-ro, cruise etc.) the standards need to be accepted and respected by all trades, e.g., not only by container or tanker sector, i.e. the standards need to be trade agnostic.

4.3 As ports are all different from one another, the standards should be flexible enough to be implemented at each port.

4.4 As shipping operates in a network of up to 8.000 ports (Lloyds Maritime Atlas), it is crucial that the data connection to ports is the same.

4.5 For harmonized information exchange between humans, it is important to use the same non-technical definitions. E.g., do we use the same definitions for berth or depths. For nautical data the standards and guidelines of the International Hydrographic Organization (IHO) have been used.
Links to the IHO standards:

- IHO Concept Register: https://registry.iho.int/fc/list.do
- IHO Data Dictionary Register: https://registry.iho.int/fc/list.do
- IHO S-4: https://iho.int/uploads/user/pubs/standards/s-4/S4_V4-9-0_March_2021.pdf
- IHO S-32: http://iho-ohi.net/S32/engView.php
- IHO S-131: https://registry.iho.int/productspec/view.do?idx=193&product_ID=S-131&statusS=5&domainS=ALL&category=product_ID&searchValue=

4.7 For harmonized data exchange between computers, it is important to use the same technical definitions. E.g., do we use the same technical and business performance specifications to build an Automation Programming Interfaces (API). An API proves to be a very effective way for data owners to keep data users up to date: it takes less time to build an API then to build a website or to populate different questionnaires or data bases. For nautical data the API specifications are based on IHO S-131 and Json. Json is an open standard file format and data interchange format that uses human-readable text to store and transmit data objects. In future the API should also cater for tracking changes.

4.8 A robust globally unique identifier is needed for locations in port. Ensuring data compatibility with other data bases, the supply chain (ISO/IEC1998:2017) , and in between layers of S-100 ENC's. On top of this the ship and berth identifier can be used together for a robust ship – berth compatibility check. This can be done by using the Global Location Number (ISO/IEC 6523, e.g., 8719331161329), which can also be used as an Marine Resource Number (MRN, e.g., urn:mrngs1:gln 8719331161329).

5 Input for Electronic Navigational Chart

5.1 General

The data scope is based on the current S-57 standard:

- Terminal
- Berth
- Berth Position
- Berth Pocket Maintained Depth
- Berth Pocket Nature of Seabed

The reasoning is that the current S-57 ENC cannot hold much more details regarding port infrastructure, and the exchange of soundings requires too much data capacity.

The data ownership is best organized by the port as the single point of contact for hydrographic office and IMO.

The reasoning is that e.g., the assignment of the Global Location Number is best organized by the port, as the number won't change after change of ownership (e.g., if the terminal is sold to a different operator), which is important to maintain data compatibility.

5.2 Terminal

Terminal

IHO Concept Register: terminal

Definition: A terminal covers that area on shore which provides buildings and constructions for the transfer of cargo or passengers from and to ships

Terminal-Global Location Number

IHO Concept Register: globalLocationNumber

Definition: A globally unique, standardized identifier for parties and locations in business processes or supply chains

Format: ISO/IEC 6523; 13 digits in text format

Remark 1: Global Location Numbers may be used to identify physical or digital locations, legal entities, organizational subdivisions or departments. A Global Location Number must conform to the GLN format specified in GS1 General Specifications

Remark 2: for all terminals. Ideally assigned by the port authority so the number remains the same after change of ownership, and not losing data connectivity

Terminal-Name

IHO Concept Register: Name

Definition: the individual name of a feature

Format: text.

Remark: for all berths. Name will change after change of ownership. Possibly combined with name of terminal name for better human recognition

Terminal-Latitude/Longitude

IHO S-100: Every feature has geometry

Description: can hold the coordinates (latitude and longitude) for a point, or surface area

Format: for information exchange: degrees and decimal minutes; datum WGS84; for data exchange: decimal degrees to a defined precision (minus to indicate South and West); datum WGS84

Remark: for all terminals; for points a centre of gravity is chosen

Terminal-Port Facility Number

IHO S-131: Terminal::port FaciltiyNumber

Definition: Number assigned to the port facility in the IMO port facility database

Format: UN/LOCODE and a 4-digit code separated with a dash

Remark: only for terminals with ISPS

Terminal-SMDG Code

IHO S-131: Terminal::sMDGCode

A code from the SMDG (ShipMessage DesignGroup) Terminal Code List

Format: UN/LOCODE + SMDG Code (Alphanumeric between 3 and 6 characters)

Remark: only for terminals handling container and/or ro-ro; code may change after change of ownership

Terminal-Types

Bulk Terminal

IHO ConceptRegister: bulkTerminal

Definition: A terminal for the handling of bulk materials such as iron ore, coal, etc.

Container Terminal

IHO ConceptRegister: containerTerminal

Definition: A terminal with facilities to load/unload or store shipping containers

Ferry Terminal

IHO ConceptRegister: ferryTerminal

A terminal for passenger and vehicle ferries

Fishing Harbour

IHO ConceptRegister: fishingHarbour

Definition: A harbour with facilities for fishing boats

Naval Base

IHO ConceptRegister: navalBase

Definition: A centre of operations for naval vessels

Passenger Terminal

IHO ConceptRegister: passengerTerminal

A terminal for the loading and unloading of passengers

Pilotage Service

IHO ConceptRegister: pilotageService

Definition: The services of a person who directs the movements of a vessel through pilot water, usually a person who has demonstrated extensive knowledge of channels, aids to navigation, dangers to navigation etc, in a particular area and is licensed for that area, are available

Quarantine Station

IHO ConceptRegister: quarantineStation

A medical control center located in an isolated spot ashore where patients with contagious diseases from vessel in quarantine are taken

Ro Ro Terminal

IHO ConceptRegister: roRoTerminall

A terminal for roll-on roll-off ferries with facilities to load/unload or store shipping containers

Service Harbour

IHO ConceptRegister: serviceHarbour

Definition: A harbour within which the floating equipment)dredgers, tugs…) of harbour services are stationed

Service and Repair

IHO ConceptRegister: sserviceAndRepair

Definition: A place where mechanical services and repairs can be undertaken to engines or other vessel equipment

Ship Lift

IHO ConceptRegister: shipLift

Definition: A platform powered by synchronous electric motors (for example syncrolift) used to lift vessels (larger than boats) in and out of the water

Shipyard

IHO ConceptRegister: shipyard

Definition: A place where ships are built or repaired

Straddle Carrier

IHO ConceptRegister: straddleCarrier

Definition: A wheeled vehicle designed to lift and carry container or vessels within its own framework.
It is used for moving, and sometimes stacking, shipping containers and vessels

Tanker Terminal

IHO ConceptRegister: tankerTerminal

A terminal for the bulk handling of liquid cargoes

Yacht Harbour / Marina

IHO ConceptRegister: yachtHarbourMarina

Definition: A harbour facility for small boats, yachts, etc. where supplies, repairs and various services
are available

Terminal-API

```
"terminal": [{

        "gln": "8719331161350",

        "name":  "RWG",

        "type": "Container Terminal",

        "portfacilitynumber": "NLRTM-0467",

        "coordinate": {

                "latitude": 51.952891,

                "longitude": 3.984563

        }]
```

Terminal-Image
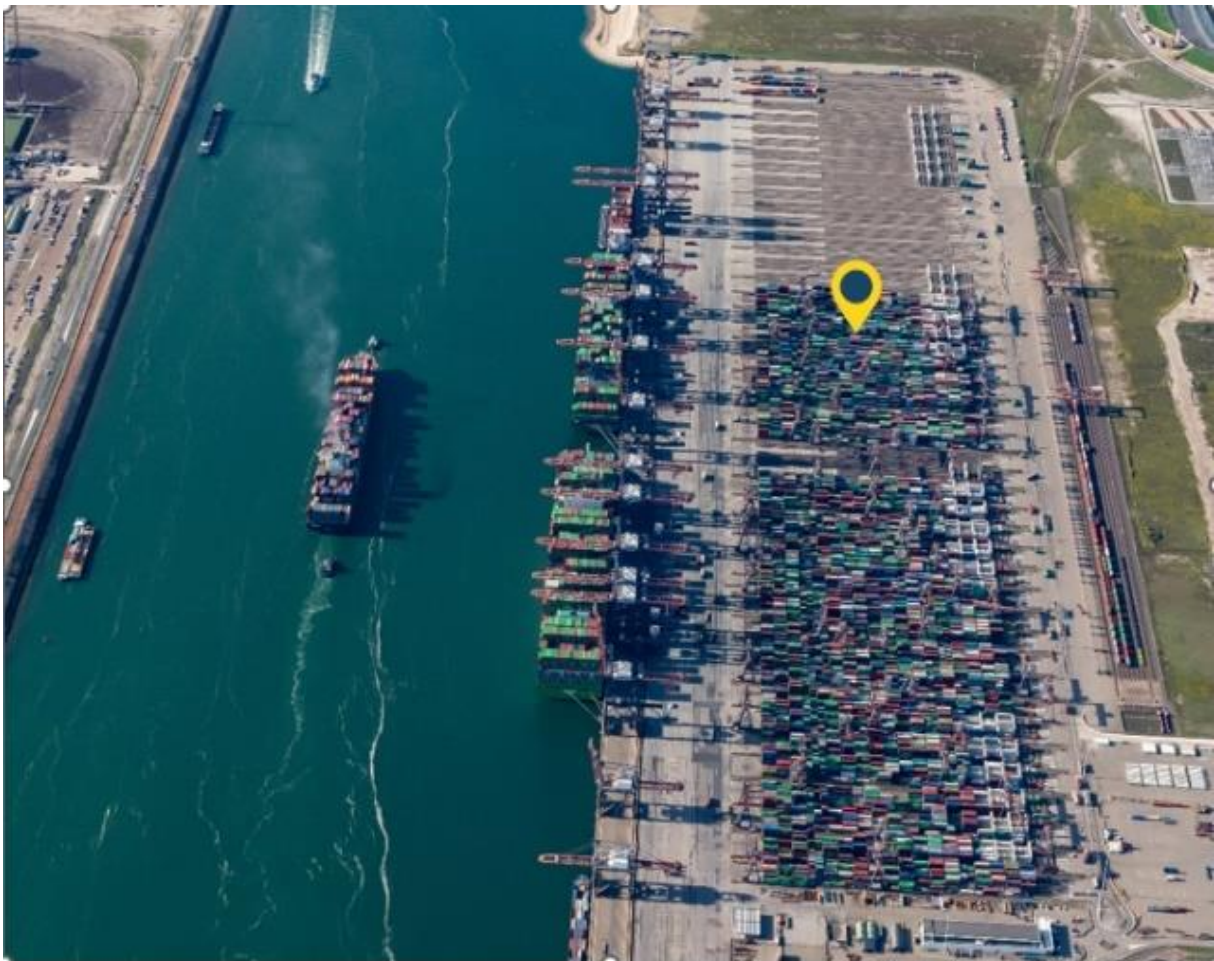
5.3 Berth

Berth

IHO Concept Register: berth

Definition: A place, generally named or numbered, where a vessel may moor or anchor

Berth-Global Location Number

Concept Register: globalLocationNumber

Definition: A globally unique, standardized identifier for parties and locations in business processes or supply chains

Format: ISO/IEC 6523; 13 digits in text format

Remark 1: Global Location Numbers may be used to identify physical or digital locations, legal entities, organizational subdivisions or departments. A Global Location Number must conform to the GLN format specified in GS1 General Specifications

Remark 2: for all berths. Ideally assigned by the port authority so the number remains the same after change of ownership, and not losing data connectivity

Berth-Name

Concept Register: Name

IHO Concept Register: Name

Definition: the individual name of a feature

Format: text.

Remark: for all berths. Name will change after change of ownership. Possibly combined with name of terminal name for better human recognition

Berth-Latitude/Longitude

IHO S-100: Every feature has geometry

Description: can hold the coordinates (latitude and longitude) for a point, or surface area

Format: for information exchange: degrees and decimal minutes; datum WGS84, for data exchange decimal degrees to a defined precision (minus to indicate South and West); datum WGS84

Remark:

- For fender berths: curve (=line). The berth's extent is between its two extremities measured in a straight line, indicated by A and B, orientation is not important. The line represents the fender line, being the position of the ship's side when alongside.
- For Multi Buoy Mooring (MBM) berths: surface (=polygon). The berth's extent is between the positions of the mooring buoys (this should also allow for the length of mooring lines)
- For anchor berths: point, surface (=circle)

Berth-Type

Anchor Berth

IHO ConceptRegister

A designated area of water where a vessel, sea plane, etc., may anchor

Fender or Breasting Dolphin

IHO ConceptRegister

A post or group of posts driven into the seabed or riverbed, used to assist in berthing of vessels by taking up some berthing loads; keep vessels from pressing against the pier structure; or to protect structures from possible impact by ships

Mole

IHO Concept Register: categoryOfShorelineConstruction

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

Multi Buoy Mooring (MBM) Berth

IHO ConceptRegister

A designated facility where a vessel may moor, usually by a combination of the mooring buoys and the ship's anchors

Open Face Wharf

IHO Concept Register: categoryOfShorelineConstruction

 A wharf supported on piles or other structures which allow free circulation of water under the wharf.

Pier (Jetty)

IHO Concept Register: categoryOfShorelineConstruction

A long, narrow structure extending into the water to afford a berthing place for vessels, to serve as a promenade, etc.

Quay

IHO Concept Register: categoryOfShorelineConstruction

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

Ramp

IHO Concept Register: categoryOfShorelineConstruction

(1) A sloping structure which may include rails that can either be used, as a landing place, at variable water levels, for small vessels, landing ships, or a ferry boat, or for hauling a cradle carrying a vessel. (2) An accumulation of snow that forms an inclined plane between land or land ice elements and sea ice or ice shelf. Also called drift ice foot.

Slipway

IHO Concept Register: categoryOfShorelineConstruction

The prepared and usually reinforced inclined surface on which keel- and bilge-blocks are laid for supporting a vessel under construction

Solid Face Wharf

IHO Concept Register: categoryOfShorelineConstruction

A wharf consisting of a solid wall of concrete, masonry, wood etc., such that the water cannot circulate freely under the wharf. The type of construction affects ship-handling; for example, a solid face wharf may give shelter from tidal streams, but under certain circumstances a cushion of water may build up between such a wharf and a ship attempting to berth at it, causing difficulties in ship handling.

Tie-Up Wall

IHO Concept Register: categoryOfShorelineConstruction

A section of wall designated for tying-up vessels awaiting transit. Bollards and mooring devices are available for both large and small ships
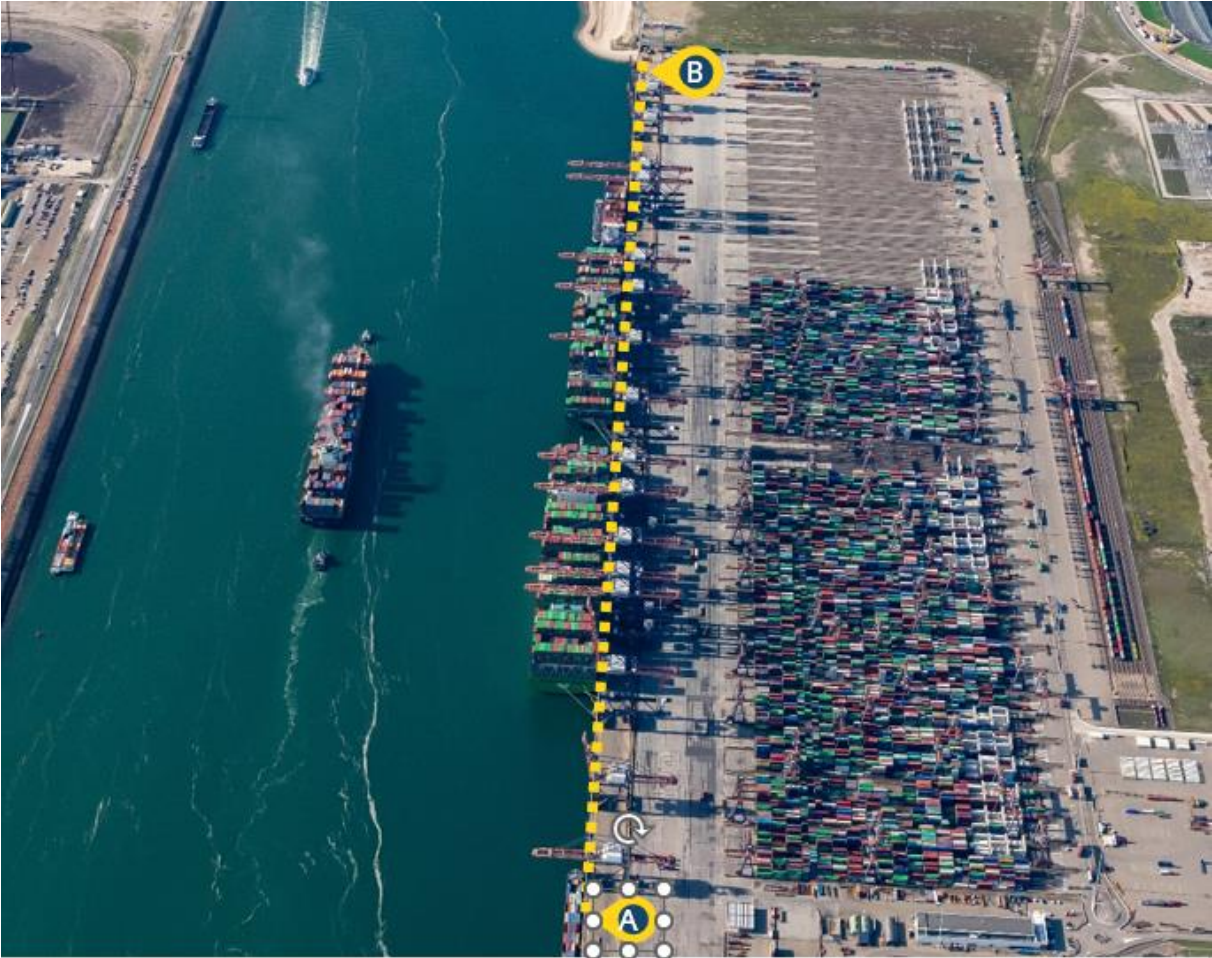
Wharf

IHO Concept Register: categoryOfShorelineConstruction

A structure serving as a berthing place for vessels.

Berth-API

"berths": [{

      "gln": "871933164764",

      "name": "DS QUAY",

      "type": "fender berth",

      "coordinateA": {

            "latitude": 51.974834,

            "longitude": 3.986750

            },

      "coordinateB": {

            "latitude": 51.95644195,

            "longitude": 3.995982

            }

      }]

Berth-API

Berth-Image

5.4 Berth Position

Berth Position

IHO Concept Register: berthPosition

Definition: A specific position within a berth where a vessel may be moored or anchored

Berth Position-Global Location Number

IHO Concept Register: globalLocationNumber

Definition: A globally unique, standardized identifier for parties and locations in business processes or supply chains

Format: ISO/IEC 6523; 13 digits in text format plus extension (for the Berth Position name or number) separated with a dash

Remark 1: Global Location Numbers may be used to identify physical or digital locations, legal entities, organizational subdivisions or departments. A Global Location Number must conform to the GLN format specified in GS1 General Specifications

Remark 2: for all terminals. Ideally assigned by the port authority so the number remains the same after change of ownership, aligned with IMO vessel number practices

Berth Position-Name

IHO Concept Register: Name

Definition: the individual name of a feature

Format: text.

Remark: for all berth positions. Name will change after change of ownership.

Berth Position-Latitude/Longitude

IHO S-100: Every feature has geometry

Description: can hold the coordinates (latitude and longitude) for a point, or surface area

Format for information exchange: degrees and decimal minutes; datum WGS84; for data exchange: decimal degrees to a defined precision (minus to indicate South and West), datum WGS84

Berth Position-Types

Bollard number

IHO Data Dictionary Register

A bollard is a small shaped post, mounted on a wharf or dolphin used to secure ship's lines.

Meter mark number

IHO Data Dictionary Register

An identifier for a specific position along a linear or curvilinear extent of a wharf, quay, or jetty. Numbering may be continued over multiple segments

Loading arm / manifold number

IHO Data Dictionary Register

An identifier for a specific location on a manifold (a pipe or chamber with several openings)

Ramp number

IHO Data Dictionary Register

An identifier for a specific ramp (a sloping structure that can be used as a landing place for small vessels, landing ships, or a ferry boat, or for hauling a cradle carrying a vessel, or for the transfer of rolling cargo).

Berth Position-API

"berthPosition": [{

       "gln": "871933164764-25",

       "name": "25",

       "type": "Bollard",

       "coordinate": {

              "latitude": 51.952891,

              "longitude": 3.984563

              }

       }]

Berth Position-Image

Berth Position-API
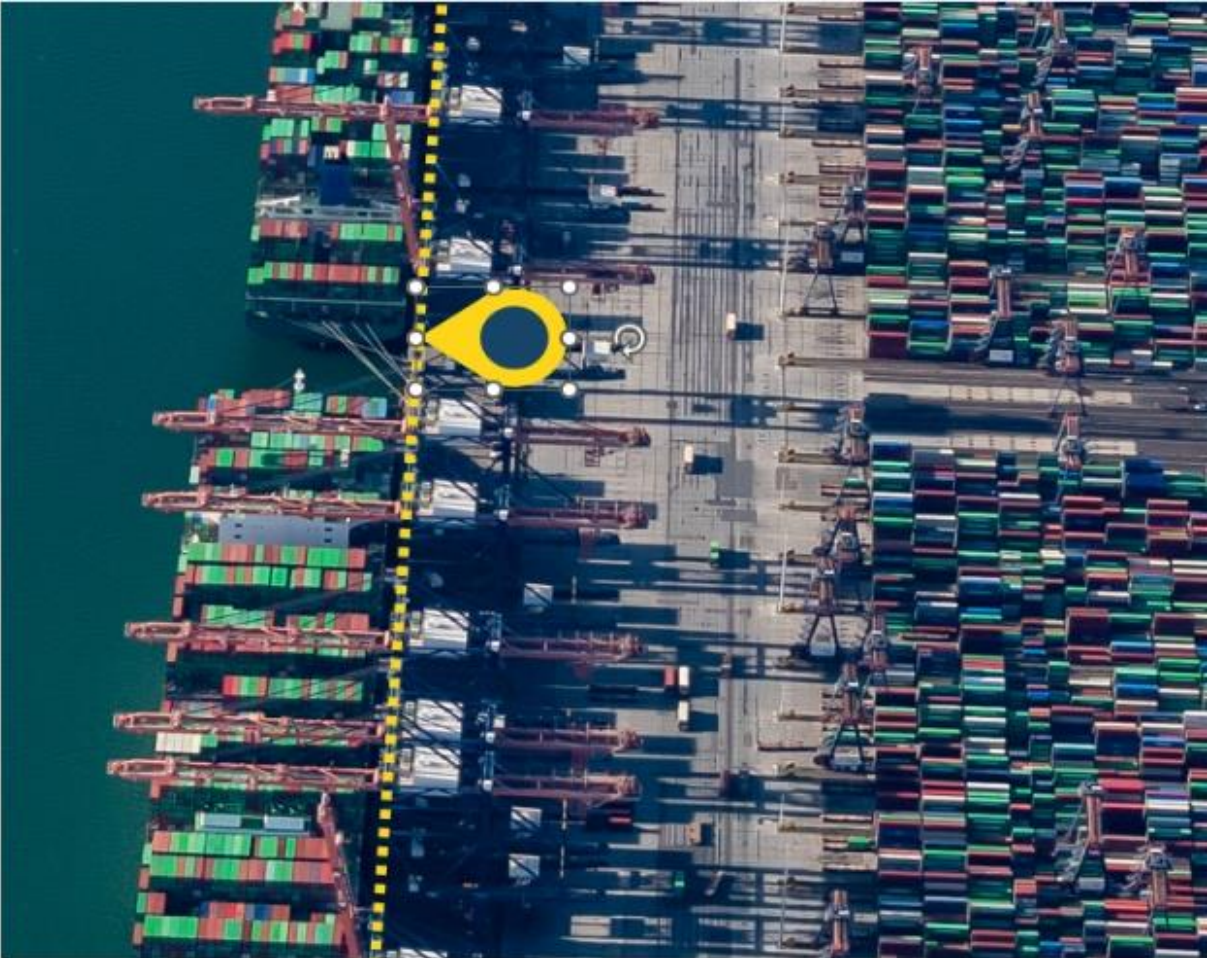
5.4 Berth Pocket

Berth Pocket

IHO ConceptRegiser: berthPocket

Definition: A body of water at a berth or anchor berth, of adequate dimensions to allow a vessel to make fast to the shore, mooring buoy, berthing dolphins or to anchor

Berth Pocket-Global Location Number

Concept Register: globalLocationNumber

Definition: A globally unique, standardized identifier for parties and locations in business processes or supply chains

Format: ISO/IEC 6523; 13 digits in text format

Remark 1: Global Location Numbers may be used to identify physical or digital locations, legal entities, organizational subdivisions or departments. A Global Location Number must conform to the GLN format specified in GS1 General Specifications

Remark 2: for all berth pockets. Ideally assigned by the port authority so the number remains the same after change of ownership, and not losing data connectivity

Berth Pocket-Name

Concept Register: Name

IHO Concept Register: Name

Definition: the individual name of a feature

Format: text.

Remark: for all berths pockets. Name will change after change of ownership. Possibly combined with name of terminal name for better human recognition

Berth Pocket-Latitude/Longitude

IHO S-100: Every feature has geometry

Description: can hold the coordinates (latitude and longitude) for a point, or surface area

Format: for information exchange: degrees and decimal minutes; datum WGS84, for data exchange decimal degrees to a defined precision (minus to indicate South and West); datum WGS84

Remark:

Berth Pocket-Maintainted Depth

IHO ConceptRegister: maintainedDepth

Definition: The depth at which a channel is kept by human influence, usually by dredging
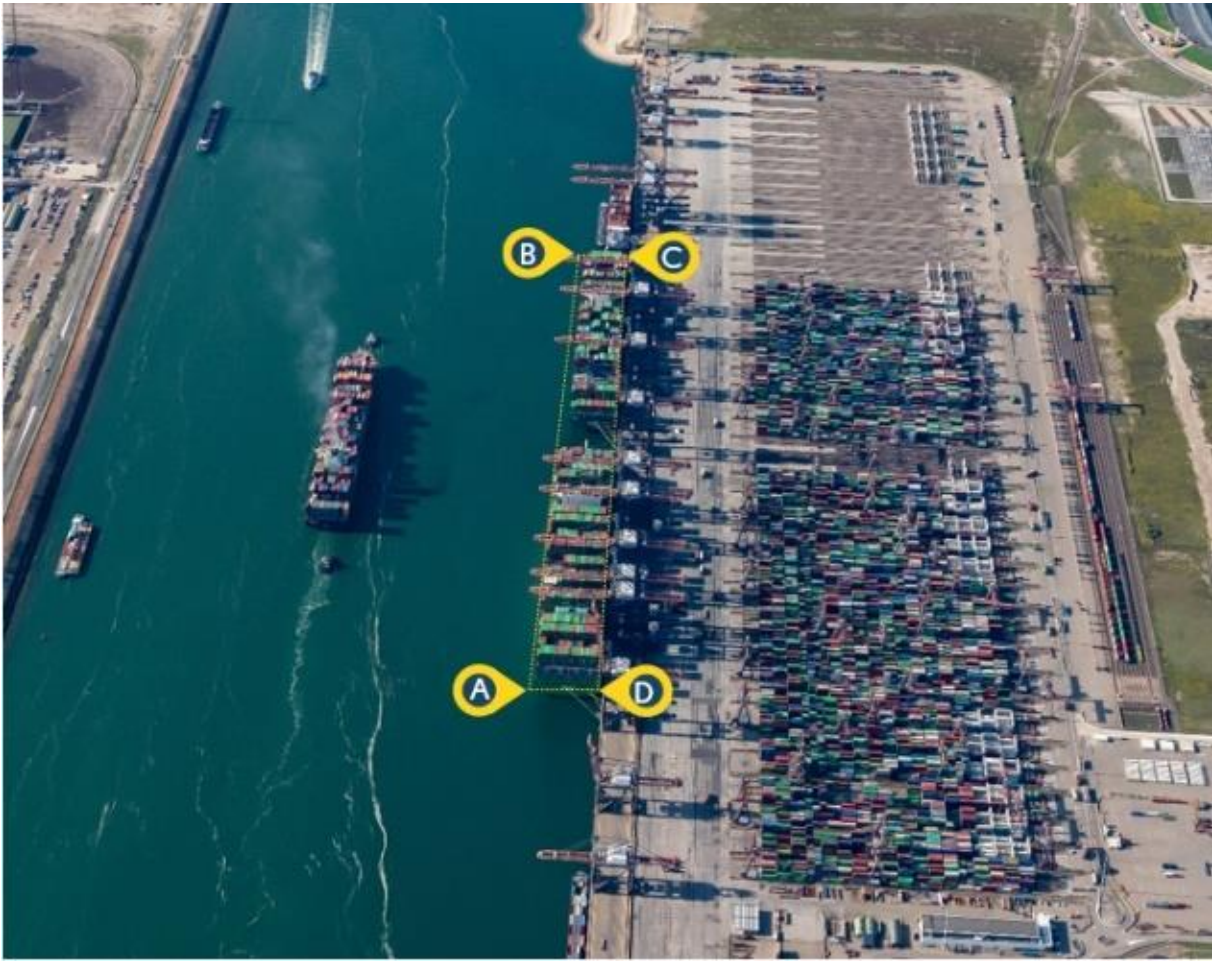
Berth Pocket-Nature of Seabed

IHO S-4: 423-427

- Sand
- Mud
- Clay
- Silt
- Stones
- Gravel
- Pebbles
- Cobbles
- Rock, Rocky

Berth Pocket-Nature of Seabed

Berth Pocket-API

"berthPocket": [{

       "gln": "871933164982",

       "maintainedDepth": 10.5,

       "chartDatum": Lowest Astronomical Tide,

       "natureofSeabed": mud,

       "coordinateA": {

              "latitude": 51.974834,

              "longitude": 3.986750

       },

       "coordinateB": {

              "latitude": 51.95644195,

              "longitude": 3.995982

       },

       "coordinateC": {

              "latitude": 51.974834,

              "longitude": 3.986750

       },

       "coordinateD": {

              "latitude": 51.95644195,

              "longitude": 3.995982

       }]

Berth Pocket-Image

Berth Pocket Maintained Depth-Image

Labels in image:
- 2. Height of the tide
- 1. ALAT
- 3. Maintained depths
- 4. Soundings
- 5. Overdredge