NORTH ATLANTIC TREATY ORGANISATION

(NATO)

ADDITIONAL MILITARY LAYERS

MARITIME FOUNDATION AND FACILITIES PRODUCT SPECIFICATION

Version 1.0, 1 November 2001

Produced and issued by the United Kingdom Hydrographic Office
under the direction of the Ad Hoc Hydrographic Working Group of
the NATO Geographic Conference.

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1 INTRODUCTION

1.1 SCOPE

The main body of this Product Specification describes the content and defines the data dictionary of the AML Maritime Foundation and Facilities product, independent of any exchange standard data format. The schema and data format imposed by the chosen exchange standard implementation are defined in separate annexes (where provided).

It has been prepared in accordance with the draft NATO STANAG 4564, Performance Standards for Warship Electronic Chart Display and Information System (WECDIS) Data Products, and is based on the proposed Common Product Specification Framework which is contained as Annex B to the draft STANAG.

MFF is designed to provide a suitable reference framework where users are:

a: not using AML products with standard electronic mapping or charting products (eg: VMAP, ENC, DNC or ARCS) as a backdrop / context

b: not using AML products that provide such a context, for example CLB or ESB.

Its major content is the coastline together with a variety of other information which can be categorised as follows:

- Framework

-major lights and significant buoys
-features that constrain normal vessel movement such as traffic separation schemes
-tidal information
-magnetic information
-national boundaries and major cities
-port and harbour locations and facilities

- Miscellaneous Tactical Information

-radar reflective entities such as offshore platforms, buoys and beacons
-communications facilities and coverage
-pipeline and cable information
-fishing activity
-oil, gas or mineral production information
-ice limits
-search and rescue information
-miscellaneous seabed obstructions which cover a significant area *(note: for full information on specific seabed contacts, please refer to the AML products Small Bottom Objects and Large Bottom Objects)*

It is not therefore intended to replicate the content of a navigational chart and nations may well not produce this product where suitable scale charting products are already available.

AML MARITIME FOUNDATION AND FACILITIES MUST NOT BE USED FOR NAVIGATIONAL PURPOSES

1.2 GENERAL INFORMATION ON THE PRODUCT SPECIFICATION

1.2.1 Date of Issue

Version 1.0

1.2.2 Date of Issue

31th August 2001

1.2.3 Custodian of the Product Specification

The Custodian of this specification is the United Kingdom Hydrographic Office:

United Kingdom Hydrographic Office
Admiralty Way
Taunton
Somerset
TA1 2DN

Telephone: +44(0) 1823 337900
Fax: +44(0) 1823 284077
E-mail: aml@ukho.gov.uk

1.2.4 Relevant STANAG Number

To be assigned.

1.3 STATUS OF THE PRODUCT SPECIFICATION

This product specification has been endorsed by the Ad Hoc Hydrographic Working Group of the NATO Geographic Conference and is subject to the change control procedures implemented by that group.

1.4 SECURITY

1.4.1 Security Classification of the Specification

The Product Specification is UNCLASSIFIED.

1.4.2 Security Classification of the Product

AML Maritime Foundation and Facilities can be issued at various security classification levels according to content. AML Maritime Foundation and Facilities products of differing security levels (specified at the dataset level by the 'Protective Marking' and 'Caveat(s)' details) are physically partitioned.

The table below defines how AML Maritime Foundation and Facilities security classification information must be described at a dataset level (see section 5.3.1).

Dataset Security Classification Information	Values
International Defence Organisation (IDO) status (see note)	- North Atlantic Treaty Organisation (NATO) - North Atlantic Co-operation Council (NACC) - Partnership for Peace (PfP) - Western European Union (WEU)
Protective Marking	- COSMIC TOP SECRET - FOCAL TOP SECRET - TOP SECRET - SECRET - CONFIDENTIAL - RESTRICTED - UNCLASSIFIED
Owner Authority	e.g. UK, US
Caveat (see note)	e.g. UK/US Eyes only

NOTE:

International Defence Organisation (IDO) status and caveats are mutually exclusive. If the data has an IDO status, then the caveat is not applicable. Additionally, caveats only apply to data that has a Protective Marking of CONFIDENTIAL or above.

AML Maritime Foundation and Facilities security information may also be encoded at the following levels in a dataset:

- meta information (see section 5.5.1)
- feature attributes (see section 5.5.3)

1.4.3 Copyright Statement

Producers of AML datasets must ensure that:

- the Intellectual Property Rights of those owning the information that has been used for production of the AML product is not compromised.
- sufficient mechanisms are put in place to ensure that material is not copied either in whole or part, except as specifically required within the host system, without prior agreement of the data producer and any other copyright holders

Copyright statements should be shown at the following locations:

- on the product label
- on the product packaging
- within the product

1.5 CONTENTS OF THE DOCUMENT

The AML Maritime Foundation and Facilities Product Specification conforms to the Common Product Specification Framework (CPSF) specified in NATO STANAG No. 4564, Performance Standards for Warship Electronic Chart Display and Information System (WECDIS), Edition 1, Annex B, Data Products.

In accordance with the CPSF, the AML Maritime Foundation and Facilities Product Specification defines the real-world entities and metadata required for the production and use of the product.

This Product Specification is divided into the following sections:

- Introduction (section 1)
- General Product Description (section 2)
- General Data Description (section 3)
- Data Structure (section 4)
- Data Dictionary (section 5)
- Data Capture Guidelines (section 6)
- Data Presentation (section 7)
- Provision of Data (section 8)
- Testing Method (section 9)

Also included, as annexes to the product specification, are details of the implementation using the relevant exchange standard(s).

Each annex (if included) is identified as follows:

- AML Maritime Foundation and Facilities S-57 Implementation (ANNEX A)
- AML Maritime Foundation and Facilities DIGEST-C Implementation (ANNEX B)

A cross-reference box (an example of which is shown below) will be included for instances when there are relevant details in one or more of the implementation annexes.

ANNEX A	A. EXAMPLE

1.6 REFERENCES

The following standards and specifications affect the content of this Product Specification.

1.6.1 Standards

NATO STANAG 1059 (Edition 6)	Distinguishing Letters for Geographical Entities for use in NATO.
NATO STANAG 2211	Geodetic Datums, Ellipsoids, Grids & Grid References
NATO STANAG 4564	Standard for Warship Electronic Chart Display and Information System (WECDIS), Edition 1, Annex B, Data Products.

NATO STANAG 7074	Digital Geographic Information Exchange Standard (DIGEST), Edition 2.1, September 2000. Part 1: General Description Part 2: Theoretical Model, Exchange Structure and Encapsulation Specifications, Annex C – Vector Relational Format (VRF) Encapsulation Specification. Part 3: Codes, Parameters and Tags Part 4: Feature and Attribute Coding Catalogue (FACC)
S-57	IHO Transfer Standard for Digital Hydrographic Data, Edition 3.1, November 2000 Appendix A: Chapter 1, Object Classes Chapter 2, Attributes Annex A - IHO Codes for Producing Agencies Annex B - Attributes/Object Classes Cross Reference
S-52	Specifications for Chart Content and Display Aspects of ECDIS 5th Edition, dated December 1996 (amended March 1999) Appendix 1 Guidance on Updating the Electronic Navigational Chart
ISO 8859	Information processing - 8-bit single-byte coded graphic character sets Part 1: Latin alphabet No.1
ISO 9660	Information Processing - Volume and File Structure of CD-ROM for Information Interchange.
ANSI/IEEE 802.3	IEEE Standards for Local Area Networks, Carrier Sense Multiple Access with Collision Detection (CSMA/CD)Access Method and Physical Layer Specifications
ISO/IEC 8211	Information processing - Specification for a data descriptive file for information interchange
ISO/IEC 10646	Information technology - Universal Multiple-Octet Coded Character Set (UCS) Part 1: Architecture and Basic Multilingual Plane

1.6.2 Specifications

MIL-PRF-0089049(NIMA)	General Performance Specification, Vector Product Format (VPF) Products, dated 24 November 1998
MIL-STD-2407	Interface Standard for Vector Product Format, dated 28 June 1996
The Open GIS Abstract Specification	Open GIS Consortium. Topic 9: Quality Version 4 1999
S-57, Edition 2.0, 11/2000	Appendix B.1: ENC Product Specification

1.6.3 Other References

AML	Object and Attribute Catalogue

1.7 DEFINITIONS

AML[1] AML is a unified range of digital geospatial data products designed to satisfy the totality of NATO non-navigational maritime defence requirements.

1.8 KEY WORDS

AML
MARITIME FOUNDATION AND FACILITIES
PRODUCT SPECIFICATION

1.9 MAINTENANCE AND SUPPORT OF THE PRODUCT SPECIFICATION

Specific processes and mechanisms that are established for the maintenance of AML Product Specifications are described in the sections 1.9.1 to 1.9.6 below.

1.9.1 Frequency of Review

The AML Maritime Foundation and Facilities Product specification (version 1.0) will be frozen for a period of 2 years following endorsement.

1.9.2 Method of Maintenance

Corrections, clarifications and requests for change will be administered by the custodian. Discussion regarding proposed changes will be carried out by correspondence with national Points of Contact. Consolidated maintenance documents will be issued periodically containing published corrections and clarifications together with details of agreed extensions to the object catalogue (these will be formally incorporated into the Product Specification and become live at its next revision).

Changes to the Product Specification beyond extensions to the object catalogue will be reviewed by committee[2] during preparatory work for production of the next edition of the specification.

1.9.3 Method of Promulgation

Maintenance documents, new editions of specifications, and related documentation will be sent to nations through their appointed AML point of contact.

[1] As agreed at the AHHWG meeting on 1 July 1999.

1.9.4 Authority Responsible for Maintenance

AML Product Specifications will be maintained by the Custodian specified in section 1.2.3.

1.9.5 Error Reporting/Change Request Procedure

Comments concerning the content of the AML Product Specifications and requests for change should be addressed to the Custodian.

1.9.6 Available Support

Contact the Custodian for guidance and advice relating to this product specification.

[2] Will be a specific group reporting to the AHHWG or its successor.

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2 GENERAL PRODUCT DESCRIPTION

PRODUCT TITLE

Additional Military Layers – Maritime Foundation and Facilities.

SHORT TITLE

MFF

REFERENCE

NATO STANAG No. 4564 (Performance Standards for Warship Electronic Chart Display and Information System (WECDIS), Edition 1, Annex B, Data Products.

2.1 MAINTENANCE OF THE DATA PRODUCT

The frequency and method of provision of update or replacement data will be defined by each AML producing agency.

ANNEX A	A.1.1.8

2.2 SUPPORT FOR MULTIPLE MODES OF OPERATION

AML Maritime Foundation and Facilities data is compiled for a variety of purposes, providing a suitable reference framework where users are either not using standard electronic mapping or charting products as a backdrop, nor are they using any AML product(s) which would otherwise provide such a context. It may therefore be made available at the scale bands shown in the following table.

SCALE BAND	SCALE RANGE
1	< 1:40,000,000
2	1: 10,000,000 – 1:62,500,000
3	1: 2,000,000 – 1:12,500,000
4	1:400,000 – 1: 2,500,000
5	1:100,000 – 1:625,000
6	1:20,000 – 1:125,000
7	1:4,000 – 1:25,000
8	1:1,000 – 1:6,250
9	> 1:1,500

It must be noted that the ranges given are to be taken as indicative only. The ranges quoted above are based on the assumption that modern, vector data captured from suitable sources can be used sensibly at a range of scales from around 40% to 250% of the nominal scale. Encoders should use the lowest available band number applicable to the data in question for any particular published product.

ANNEX A	A.1.2.7.1.1 & A.1.2.8.1.1

2.2.1 Arcs

Arcs may be defined on the spheroid. Where the geometric definition of an arc is not available, it may be approximated using a suitable number of straight line segments. The compilation scale of the approximation must be stated in the metadata.

Refer to the implementation standard for specific details relating to the encoding of mathematically derived arcs.

2.2.2 Defined Straight Lines

Where the geometry of a feature is denoted as a straight-line between two defined points then this may take the form of either a loxodrome (also known as a rhumb line or line of constant bearing) or a geodesic (ie the shortest distance calculated across the spheroid). Whether such lines are portrayed as straight lines or curves will depend on the type of line and the display projection in use. Suitable attribution will be included to indicate the type of line that is to be constructed for the display of such entities.

2.3 GEOGRAPHIC ORGANISATION

2.3.1 Regional Scheme

AML products will be partitioned by geographic region. This will vary widely depending upon the scale band of the product.

2.3.2 Tiling Scheme

ANNEX A	A.1.1.1

2.4 LAYER ORGANISATION

The content of the product is not layered. However, specific exchange standards may impose their own internal layering requirements.

2.5 EXCHANGE STANDARD IMPLEMENTATION

This product specification has been written to be independent of the exchange standard used. Details of exchange standard implementations are given in the relevant annex.

2.5.1 Spatial Data Type

AML Maritime Foundation and Facilities contains spatial objects as vector data.

2.5.2 Level of Topology

The topological level of the product may be influenced by the exchange standard and so this is defined in the relevant annex.

2.5.3 Relationship with Layering

N/A

2.5.4 Textual Information

Attributes that contain free text must not be used when it is possible to encode the information by means of any other attribute.

2.5.5 Reference to External Files

Text and picture files may also be included in the AML product to provide additional information.

ANNEX A	A.1.1.5.1.2 and A.1.1.7.4

Below are examples of potential formats.

- ASCII
- TIFF
- PDF
- HTML
- JPEG
- AVI
- MPEG

2.6 SIZING REQUIREMENTS

This will be dependent upon the exchange standard implementation being used.

2.7 GENERAL SOURCE DESCRIPTION

2.7.1 Minimum Source Requirements

Sources for any real-world feature detailed in section 5.5.2 meet the following requirements

- the data capture point-density fulfils the data capture requirements specified in section 2.2
- mandatory features specified in section 5.5.2.1 are included
- the mandatory attribution levels for each object, specified in section 5.5.2, are met

2.7.2 Applicable Sources

All sources used must meet the minimum requirements. Wherever available, sources that provide exact definitions of entities (e.g. geographic co-ordinates or maintained database) should be used in preference to digitising from graphical representations.

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3 GENERAL DATA DESCRIPTION

3.1 DATUMS

Please refer to NATO STANAG 2211 – Geodetic Datums, Ellipsoids, Grids & Grid References, which establishes the NATO guidelines to the use of horizontal and vertical datums.

3.1.1 Horizontal Datum

The horizontal datum for the AML Maritime Foundation and Facilities is the World Geodetic System 1984 (WGS 84).

ANNEX A	A.1.2.7.1.3

3.1.2 Vertical Datums

3.1.2.1 *Height Datum*

The default height datum for the AML Maritime Foundation and Facilities is specified in the metadata of the dataset.

ANNEX A	A.1.2.7.1.3

The default height datum can be varied by the use of lower level metadata or feature level attribution.

ANNEX A	A.2.3.2

3.1.2.2 *Sounding Datum*

The default sounding datum for AML Maritime Foundation and Facilities is specified in the metadata of the dataset.

ANNEX A	A.1.2.7.1.3

The default sounding datum can be varied by the use of lower level metadata or feature level attribution.

ANNEX A	A.2.3.2

3.2 UNITS

The default units to be used in AML Maritime Foundation and Facilities are:

- Position: latitude and longitude in decimal degrees
- Depth: metres
- Height: metres
- Length / width: metres
- Positional accuracy: metres
- Distance: nautical miles or metres

The default units can be varied by the use of lower level metadata or feature level attribution.

3.2.1 Time

AML may contain attributes used to encode time e.g. the beginning and end of an active period for an object. When using these attributes all times should be encoded as Coordinated Universal Time (UTC). ISO 8601 states that the format for UTC time should be CCYYMMDDThhmmssZ (where 'T' is a separator). However, AML attributes that encode time using the ISO 8601 format DO NOT include the 'Z' and they should all be interpreted as UTC.

3.3 CO-ORDINATE SYSTEM

The co-ordinate system used by AML Maritime Foundation and Facilities is Latitude and Longitude. These will be recorded as:

Positive values: Used for latitudes **north** of the equator and longitudes **east** of the Greenwich Meridian.

Negative values: are used for latitudes **south** of the equator and longitudes **west** of the Greenwich Meridian.

3.4 PROJECTION

AML Maritime Foundation and Facilities is based upon geographical co-ordinates and is not projected.

3.5 LANGUAGE AND CHARACTER SETS

3.5.1 Language

The exchange language used by AML Maritime Foundation and Facilities is English.

ANNEX A	A.1.1.4

3.5.2 Character Sets

ISO 8859-1 supports English and most European languages. For those languages that it does not support ISO/IEC 10646 shall be used.

3.6 DATA QUALITY

AML Maritime Foundation and Facilities data quality information should be encoded at an appropriate level, as specified by the exchange standard implementation.

AML data quality information encompasses the following categories:

- Accuracy
- Up-to-dateness/currency
- Source(s) of the data
- Conformance to the Product Specification

Data quality information defined for AML Maritime Foundation and Facilities can be encoded in the dataset as:

- dataset metadata (see section 5.3.1)
- meta information features[1] (see section 5.5.1)
- feature attributes (see section 5.5.3)

3.6.1 Accuracy

Where applicable, the maximum two-dimensional error of AML data should be stated. All positional accuracy figures are cumulative and allow for:

- the accuracy of the original data
- additional errors introduced by the AML production process

If applicable, the cumulative error should be stated for the following:

- Horizontal Accuracy
- Sounding Accuracy
- Vertical (Height) Accuracy

3.6.2 Up-to-Dateness/Currency

Where applicable, currency information should specify the up-to-dateness of the AML dataset(s). This information should include:

- issue date
- update[2] date

3.6.3 Source(s) of the data

Where available, AML source information should include the following details:

- authority (e.g. data provider)
- source type (e.g. graphic or report)
- source ID
- source date

3.6.4 Conformance to the Product Specification

AML products may be produced to fulfil operational requirements, and therefore, may not conform fully to this Product Specification.

1 Only applicable if supported by the exchange standard implementation.

2 Only applicable if updating is supported by the exchange standard implementation.

All AML datasets must specify instances when:

- all available data/information has been encoded. Missing data means that the information is not available
- only specified/required data/information is encoded

3.6.5 Geometric Validation

All data produced for AML Maritime Foundation and Facilities must be validated for geometric anomalies.

4 DATA STRUCTURE

Refer to the appropriate implementation annex for details of specific implementation, format, and structure.

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5 DATA DICTIONARY

5.1 GENERAL GUIDELINES

This section provides real-world descriptions for the metadata and features contained within the AML Maritime Foundation and Facilities dataset. Details of how this information is to be encoded (e.g. using the chosen Exchange Standard) can be found in the tables contained in the implementation annexes.

5.2 UNKNOWN/MISSING ATTRIBUTE VALUES

The way in which an unknown or missing attribute value is handled is dependent upon the exchange standard implemented.

ANNEX A	A.2.2

5.3 USE OF META INFORMATION

AML datasets contain the following meta-information:

5.3.1 Dataset Metadata

The following table provides the descriptions of dataset meta information required by AML Maritime Foundation and Facilities to conform to this Product Specification.

For details of how to represent the dataset metadata described, refer to the appropriate exchange standard implementation annex.

ANNEX A	A.2.3.1

General/Production Information	Description
Production Agency	The agency responsible for the production of the data
Dataset Name	The name of the dataset
Edition Number	The edition number of the dataset
Date of Release	The date of the dataset was made available by the data producer (e.g. edition or revision date)
Product Specification Description	The name of the AML Product Specification to which the dataset conforms (see section 2)
Product Specification Edition Number	The edition number of the AML Product Specification to which the dataset conforms (section 1.2.1)
Product Application	The usage application scale-band of the dataset (see section 2.2)
Compilation Scale	The scale at which the data was compiled (it is recommended that this should be within the defined ranges of the ‘Product Application’ scale bands)

Security Classification Information	Description
International Defence Organisation (IDO) status (see note)	The International Defence Organisation (IDO) status (if applicable) that must precede, and be applied to, the Protective Marking thus making it an IDO Marking. - North Atlantic Treaty Organisation (NATO) - North Atlantic Co-operation Council (NACC) - Partnership for Peace (PfP) - Western European Union (WEU)
Protective marking	A marking indicating the minimum standards of protection required of the data. - COSMIC TOP SECRET - FOCAL TOP SECRET - TOP SECRET - SECRET - CONFIDENTIAL - RESTRICTED - UNCLASSIFIED
Owner Authority	The NATO country code (NATO STANAG 1059) denoting the 'owner' that is responsible for establishing and setting the protective marking level
Caveat (see note)	A component of a security clearance and/or security class used for computing access rights and controlling information flow by authorising a specific group of subjects to have access to the information

NOTE:

International Defence Organisation (IDO) status and caveats are mutually exclusive. If the data has an IDO status, then the caveat is not applicable. Additionally, caveats only apply to data that has a Protective Marking of CONFIDENTIAL or above.

Update Information	Description
Update Application Date	The date for which all previous updates (dated on or before) must have been applied
Update Number	The update number of the dataset

NOTE:

Update information is only applicable if updating is supported by the exchange standard implementation.

Datums & Units	Description
Horizontal Geodetic Datum	The horizontal geodetic datum of the dataset
Vertical Datum	The vertical datum of the dataset
Datums & Units	**Description**
Sounding Datum	The sounding datum of the dataset

Co-ordinate Units	The co-ordinate units of the dataset
Height / Length Units	The height and length units of the dataset
Depth Units	The depth units of the dataset
Positional Accuracy Units	The positional accuracy units of the dataset

5.4 MANDATORY META INFORMATION

All dataset meta information stated in section 5.3.1, including Conformance to the Product Specification and Data Coverage (stated in section 5.5.1) are mandatory.

5.5 SCHEMA

The following tables (5.5.1, 5.5.2, and 5.5.3) provide the descriptions of meta information, real-world features, and associated attributes required by AML Maritime Foundation and Facilities to conform to this Product Specification.

For details of how to represent the real-world features and associated attributes described, refer to the appropriate exchange standard implementation annex.

ANNEX A	A.2.4.1, A.2.4.2, and A.2.4.3

5.5.1 Meta Information

In the following tables, details of allowable meta information for AML Maritime Foundation and Facilities are described.

'Encoding Details' provides additional details of how meta information can be encoded, either as meta information features, or, as attributes. The terms 'specific' and 'generic' are used to indicate an attribute's association to a feature class. Attributes that are 'generic' apply to all feature classes listed in this Product Specification. Attributes listed as 'specific' relate only to those in the Features Class table in section 5.5.2, when included in the 'Associated Attributes' column.

Production Information	Description	Encoding Details
Capture Date	The date when the specific object was captured, edited or deleted.	generic attribute
Production Agency	The agency responsible for the production of the data. (IHO Codes for Producing Agencies)	generic attribute
Producing Country	The country responsible for the production of the data. (IHO Codes for Producing Agencies)	generic attribute
Data Coverage	The geographical area that describes the coverage and extent of spatial objects	Feature Class

Security Classification Information	Description	Encoding Details
International Defence Organisation (IDO) status	The International Defence Organisation (IDO) status (if applicable) that must precede, and be applied to, the Protective Marking thus making it an IDO Marking	generic attribute
Protective Marking	A marking indicating the minimum standards of protection required of the data	generic attribute
Owner Authority	The NATO country code (NATO STANAG 1059) denoting the 'owner' that is responsible for establishing and setting the protective marking level	generic attribute
Caveat	A component of a security classification used for authorising a specific group to have access rights	generic attribute

Geo-Reference Information	Description	Encoding Details
Vertical Datum	Any level surface taken as a surface of reference from which to reference elevations (IHO SP32: 1227)	specific attribute
Sounding Datum	The horizontal plane to which the soundings on a hydrographic survey are reduced. (IHO SP32: 1225)	specific attribute
Vertical Datum Shift Area	An area within which a uniform shift exists between a specific vertical datum and the datum of the data within this area	Feature Class
Interpolated Line Characteristic	The characteristics of a line used during interpolation between two points.	specific attribute (Note: varying attribute values may be attributed to different edges of the features geometry) (may be encoded on the spatial object)

Geo-Reference Information	Description	Encoding Details
Height / Length Units	Unit of measurement for heights and lengths (see note)	specific attribute
Depth Units	Unit of measurement for depths (see note)	specific attribute

NOTE:

Any feature class with attribute(s) used to encode values for; height, depth, length, or width must include an attribute for the unit of measurement.

Source Information	Description	Encoding Details
Source Date	The date of issue of the source information (if applicable)	area feature and generic attribute
Source Country	The country responsible for the production of the source (IHO Codes for Producing Agencies)	area feature and generic attribute
Source Agency	The agency responsible for the production of the source (IHO Codes for Producing Agencies)	area feature and generic attribute
Source ID	ID of the data source (e.g. chart number)	area feature and generic attribute
Source Type	The type of data source (e.g. chart, report, etc.)	area feature and generic attribute
Source Scale	The scale at which the source data has been compiled	area feature and generic attribute

NOTE:

The 'Source Agency' refers to the originators of the data and not the agency responsible for producing AML. If the source agency is not listed in IHO Codes for Producing Agencies, then the agency name should prefix any details provided in the attribute 'Source ID' using a solidus (forward slash) to separate it from the ID.

Data Quality Information	Description	Encoding Details
Absolute Horizontal Accuracy	The positional error estimate for a single point, relative to the specified spatial reference system	generic attribute (may be encoded on the spatial object)
Error Ellipse	Also known as the Figure of Merit. 95% 2sigma value - semi-major and semi-minor axes of error ellipsoid plus orientation.	generic attribute (may be encoded on the spatial object)

Data Quality Information	Description	Encoding Details
Absolute Vertical Accuracy	The vertical error estimate for a single point, relative to the specified spatial reference system	generic attribute
Relative Horizontal Accuracy	The horizontal error estimate for the distance between two points, or the accuracy of one point with respect to another	generic attribute
Relative Vertical Accuracy	The vertical error estimate for the distance between two points, or the accuracy of one point with respect to another	generic attribute
Sounding Accuracy	The error estimate for soundings relative to the specified spatial reference system	specific attribute
Quality of Position	An indication of the reliability of a quoted position	generic attribute (may be encoded on the spatial object)
Quality of Sounding Measurement	An indication of the reliability of a sounding	specific attribute
Technique of sounding measurement	Indicates the method or equipment used to obtain the object's depth	specific attribute
Conformance to the Product Specification	An indication of how well the data conforms to the product specification	Feature Class

External Reference Information	Description	Encoding Details
Image File Link	A reference to an image file containing a pictorial representation of the object	generic attribute
Text File Reference	The file name relating to an external text file	generic attribute
Text File Reference (in national language)	The file name relating to an external text file	generic attribute
Reference to a publication	Reference to a specific location of any relevant information within an external publication	generic attribute

Other Supporting Information	Description	Encoding Details
Supporting Textual Information	Supporting (free text) information relevant to the object that cannot be explicitly encoded by any other attribute	generic attribute
Supporting Textual Information (in national language)	Supporting (free text) information relevant to the object that cannot be explicitly encoded by any other attribute	generic attribute

5.5.2 Feature Classes

The following table contains the information described below:

- Feature Class – gives the name of the feature class
- Description – describes the feature class
- Associated Attributes – indicates allowable attributes relevant to each feature class. (see section 5.5.3 for attribute descriptions and values.)
- M – denotes that export of the attribute field is mandatory
- Form – indicates the geometric form that the feature class can take (i.e. **P**oint, **L**ine, or **A**rea)

In addition to the 'associated attributes' listed for individual real-world feature classes 'generic attributes' are used at the feature level. These encode meta and supporting information that may exist on any feature. Generic attributes used in AML Maritime Foundation and Facilities are described in section 5.5.1.

For details of how to encode the feature classes listed in this section, refer to the appropriate exchange standard implementation annex.

ANNEX A	A.2.4.2

Feature Class	Description	Associated Attributes		Form		
		Description	M	P	L	A
Administration area	A defined (and possibly named) administrative area.	• Category of administrative area • Interpolated line characteristic • Jurisdiction • Name (English) • Name (national language characters) • Nationality	✓	✓		✓
Beacons	*Note: only beacons of major importance are included in AML MFF. Attribution should be kept to a minimum, as indicated.*					

Feature Class	Description	Associated Attributes		Form		
		Description	M	P	L	A
Beacon, cardinal	A beacon is a prominent specially constructed object forming a conspicuous mark as a fixed aid to navigation or for use in hydrographic survey. (IHO S-32: 420) A cardinal beacon is used in conjunction with the compass to indicate where the mariner may find the best navigable water. It is placed in one of the four quadrants (North, East, South and West), bounded by inter-cardinal bearings from the point marked.	• Category of cardinal mark • Conspicuous, radar • End date • Height • Height / length units • Marks – navigational – system of • Seasonal start date • Seasonal end date • Start date • Status • Vertical datum	✓	✓		
Beacon, isolated danger	A beacon is a prominent specially constructed object forming a conspicuous mark as a fixed aid to navigation or for use in hydrographic survey. (IHO S-32: 420) An isolated danger beacon is a beacon erected on an isolated danger of limited extent which has navigable water all around it. (UKHO NP735, 5th edition)	• Conspicuous, radar • End date • Height • Height / length units • Marks – navigational – system of • Seasonal start date • Seasonal end date • Start date • Status • Vertical datum		✓		
Beacon, lateral	A beacon is a prominent specially constructed object forming a conspicuous mark as a fixed aid to navigation or for use in hydrographic survey. (IHO S-32: 420) A lateral beacon is used to indicate the port or starboard hand side of the route to be followed. They are generally used for well defined channels and are used in conjunction with a conventional direction of buoyage. (UKHO NP735, 5th edition)	• Category of lateral mark • Conspicuous, radar • End date • Height • Height / length units • Marks - navigational – system of • Seasonal start date • Seasonal end date • Start date • Status • Vertical datum	✓	✓		

Feature Class	Description	Associated Attributes		Form		
		Description	M	P	L	A
Beacon, safe water	A beacon is a prominent specially constructed object forming a conspicuous mark as a fixed aid to navigation or for use in hydrographic survey. (IHO S-32: 420) A safe water beacon may be used to indicate that there is navigable water around the mark. (UKHO NP735, 5th Edition)	• Conspicuous, radar • End date • Height • Height / length units • Marks – navigational – system of • Seasonal start date • Seasonal end date • Start date • Status • Vertical datum		✓		
Beacon, special purpose	A beacon is a prominent specially constructed object forming a conspicuous mark as a fixed aid to navigation or for use in hydrographic survey. (IHO S-32: 420) A special purpose beacon is primarily used to indicate an area or feature, the nature of which is apparent from reference to a chart, Sailing Directions or Notices to Mariners. (UKHO NP735, 5th edition)	• Category of special purpose mark • Conspicuous, radar • End date • Height • Height / length units • Marks – navigational – system of • Seasonal start date • Seasonal end date • Start date • Status • Vertical datum	✓	✓		
Built-up area	An area containing a concentration of buildings and the supporting road or rail infrastructure. (S-57 Annex A, Appendix A, Chapter 2 Attributes)	• Condition • Conspicuous, radar • Conspicuous, visually • Height • Height / length units • Name (English) • Name (national language characters) • Type of built-up area • Vertical datum		✓		✓
Buoys	*Note: only conical, can, spherical, pillar, spar, barrel and super buoys (LANBY and ODAS) are included in AML MFF. Attribution should be kept to a minimum, as indicated.*					

Feature Class	Description	Associated Attributes		Form		
		Description	M	P	L	A
Buoy, cardinal	A buoy is a floating object moored to the bottom in a particular place, as an aid to navigation or for other specific purposes. (IHO SP-32: 565) A cardinal buoy is used in conjunction with the compass to indicate where the mariner may find the best navigable water. It is placed in one of the four quadrants (North, East, South and West), bounded by inter-cardinal bearings from the point marked. (UKHO NP 735, 5th Edition)	• Category of cardinal mark • Conspicuous, radar • End date • Marks – navigational – system of • Seasonal start date • Seasonal end date • Start date • Status	✓	✓		
Buoy, installation	A buoy is a floating object moored to the bottom in a particular place, as an aid to navigation or for other specific purposes. (IHO SP-32: 565) An installation buoy is a buoy used for loading tankers with gas or oil. (IHO Chart Specifications, M-4)	• Category of installation buoy • Conspicuous, radar • End date • Marks – navigational – system of • Product • Seasonal start date • Seasonal end date • Start date • Status		✓		
Buoy, isolated danger	A buoy is a floating object moored to the bottom in a particular place, as an aid to navigation or for other specific purposes. (IHO SP-32: 565) An isolated danger buoy is a buoy moored on or above an isolated danger of limited extent which has navigable water all around it. (UKHO NP735, 5th edition)	• Conspicuous, radar • End date • Marks – navigational – system of • Seasonal start date • Seasonal end date • Start date • Status		✓		

Feature Class	Description	Associated Attributes		Form		
		Description	M	P	L	A
Buoy, lateral	A buoy is a floating object moored to the bottom in a particular place, as an aid to navigation or for other specific purposes. (IHO SP-32: 565) A lateral buoy is used to indicate the port or starboard hand side of the route to be followed. They are generally used for well defined channels and are used in conjunction with a conventional direction of buoyage. (UKHO NP735, 5th edition)	• Category of lateral mark • Conspicuous, radar • End date • Marks – navigational – system of • Seasonal start date • Seasonal end date • Start date • Status	✓	✓		
Buoy, safe water	A buoy is a floating object moored to the bottom in a particular place, as an aid to navigation or for other specific purposes. (IHO SP-32: 565) A safe water buoy may be used to indicate that there is navigable water around the mark. (UKHO NP735, 5th Edition)	• Conspicuous, radar • End date • Marks – navigational – system of • Seasonal start date • Seasonal end date • Start date • Status		✓		
Buoy, special purpose	A buoy is a floating object moored to the bottom in a particular place, as an aid to navigation or for other specific purposes. (IHO SP-32: 565) A special purpose buoy is primarily used to indicate an area or feature, the nature of which is apparent from reference to a chart, Sailing Directions or Notices to Mariners. (UKHO NP735, 5th edition)	• Category of special purpose mark • Conspicuous, radar • End date • Marks – navigational – system of • Seasonal start date • Seasonal end date • Start date • Status	✓	✓		
Cable area	An area which contains one or more submarine cables.	• End date • Name (English) • Name (national language characters) • Restriction(s) • Start date • Status • Type of cable				✓

Feature Class	Description	Associated Attributes		Form		
		Description	M	P	L	A
Cable, submarine	An assembly of wires or fibres, or a wire rope or chain which has been laid underwater or buried beneath the seabed. (Hydrographic Service, Royal Australian Navy)	• Buried depth • Condition • Depth range – shoalest value • Depth range – deepest value • Depth units • End date • Height / length units • Interpolated line characteristic • Name (English) • Name (national language characters) • Restriction(s) • Sounding accuracy • Sounding datum • Start date • Status • Type of cable			✓	
Coastguard station	Watch keeping stations at which a watch is kept either continuously, or at certain times only. (IHO Chart Specs, M-4)	• Category of coastguard station • Date end • Date start • Name (English) • Name (national language characters) • Periodic date end • Periodic date start • Status		✓		
Coastline	The line where shore and water meet. Although the terminology of coasts and shores is rather confused, shoreline and coastline are generally used as synonyms. (IHO Dictionary, S-32, 5th Edition, 858,4695)	• Conspicuous, radar • Conspicuous, visually • Elevation • Height / length units • Name (English) • Name (national language characters) • Vertical datum			✓	
Conformance to the Product Specification	An area in which data is of a specified conformance to the product specification. (AML)	• Category of conformance	✓			✓

Feature Class	Description	Associated Attributes		Form		
		Description	M	P	L	A
Data Coverage	A geographical area that describes the coverage and extent of spatial objects. (AML)	• Category of coverage	✓			✓
Data Source Area *(This feature uses the generic source information attributes to encode source information which is applicable to an area. Features within the area need not be individually attributed)*	A geographical area that describes the spatial extent of a data source. (AML)	• *Source agency* • *Source country* • *Source date* • *Source ID* • *Source scale* • *Source type*				✓
Deep water route centerline	A deep water route is a route in a designated area, within defined limits, which has been accurately surveyed for clearance of sea bottom and submerged obstacles to a minimum indicated depth of water. (IHO Dictionary, S-32, 5th Edition, 1280) The deep water route centerline indicates the centerline of a route, the width of which is not explicitly defined. (AML)	• Category of recommended track • Depth range – shoalest value • Depth range – deepest value • Depth units • End date • Interpolated line characteristic • Name (English) • Name (national language characters) • Orientation • Quality of sounding measurement • Sounding accuracy • Sounding datum • Start date • Status • Traffic flow			✓	
Deep water route composite	A composite feature which enables the components of a deep water route to be combined into a single feature. (AML)	• Name (English) • Name (national language characters)		No geometry required		

Feature Class	Description	Associated Attributes		Form		
		Description	M	P	L	A
Deep water route - part	A deep water route is a route in a designated area, within defined limits, which has been accurately surveyed for clearance of sea bottom and submerged obstacles to a minimum indicated depth of water. (IHO Dictionary, S-32, 5th Edition, 1280)	• Depth range – shoalest value • Depth range – deepest value • Depth units • End date • Interpolated line characteristic • Name (English) • Name (national language characters) • Orientation • Quality of sounding measurement • Restriction(s) • Sounding accuracy • Sounding datum • Start date • Status • Traffic flow				✓
Ferry route	A route in a body of water where a ferry crosses from one shoreline to another. (DGIWG October 1987)	• Category of ferry • Depth range – shoalest value • Depth units • End date • Name (English) • Name (national language characters) • Seasonal start date • Seasonal end date • Sounding accuracy • Sounding datum • Start date • Status			✓	✓
Fishing facility	A structure in shallow water for fishing purposes which can be an obstruction to ships in general. The position of these structures may vary frequently over time.	• Category of fishing facility • Height / length units • Name (English) • Name (national language characters) • Seasonal start date • Seasonal end date • Status • Vertical length		✓	✓	✓

Feature Class	Description	Associated Attributes		Form		
		Description	M	P	L	A
Fishing ground	A water area in which fishing is frequently carried on. (IHO Dictionary, S-32, 5th Edition, 1814)	• Name (English) • Name (national language characters) • Seasonal start date • Seasonal end date • Status				✓
Harbour area (administrative)	The area over which a harbour authority has jurisdiction.	• Interpolated line characteristic • Name (English) • Name (national language characters) • Status				✓
Harbour facility	A harbour installation with a service or commercial operation of public interest.	• Category of harbour facility • Condition • End date • Name (English) • Name (national language characters) • Nature of construction • Seasonal start date • Seasonal end date • Start date • Status	✓	✓		✓
Ice area	An area of ice over land or water.	• Classification of ice • Conspicuous, visually • Elevation • Height • Height / length units • Name (English) • Name (national language characters) • Seasonal start date • Seasonal end date • Status • Vertical datum • Vertical length	✓			✓

Feature Class	Description	Associated Attributes		Form		
		Description	M	P	L	A
Inshore Traffic Zone	A routeing measure comprising a designated area between the landward boundary of a traffic separation scheme and the adjacent coast, to be used in accordance with the provisions of the International Regulations for Preventing Collisions at Sea. (IHO Dictionary, S-32, 5th Edition, 2457)	• Category of Traffic Separation Scheme • End date • Restriction(s) • Start date • Status	✓			✓
Land area	The solid portion of the Earth's surface, as opposed to sea, or water. (IHO SP-32: 2635)	• Condition • Name (English) • Name (national language characters) • Status		✓	✓	✓
Major Lights	*Note: major lights are those deemed to have a nominal range equal to or greater than 15 miles; or where the light is on an island; or where the geographical distribution of lights is so sparse as to warrant the inclusion of lights with a lesser range. Attribution should be kept to a minimum, as indicated below.*					
Light	A luminous or lighted aid to navigation. (Adapted from IHO Dictionary, S-32, 5th Edition, 2766)	• Category of light • End date • Height • Height / length units • Light characteristic • Marks navigational – system of • Name (English) • Name (national language characters) • Seasonal start date • Seasonal end date • Start date • Status • Value of nominal range • Vertical datum	✓	✓		
Light float	A boat-like structure used instead of a light buoy in waters where strong streams or currents are experienced, or when a greater elevation than that of a light buoy is necessary (IHO Dictionary, S-32, 5th Edition, 2821).	• Conspicuous, radar • End date • Name (English) • Name (national language characters) • Seasonal start date • Seasonal end date • Start date • Status	✓	✓		

Feature Class	Description	Associated Attributes		Form		
		Description	M	P	L	A
Light vessel	A distinctively marked vessel anchored or moored at a charted point, to serve as an aid to navigation. By night, it displays a characteristic light(s) and is usually equipped with other devices, such as fog signal, submarine sound signal, and radio-beacon, to assist navigation. Also called light ship. (IHO Dictionary, S-32, 5th Edition, 2828,2829)	• Conspicuous, radar • End date • Name (English) • Name (national language characters) • Seasonal start date • Seasonal end date • Start date • Status	✓	✓		
Local magnetic anomaly	An anomaly of the magnetic field of the earth, extending over a relatively small area, due to local magnetic influences (IHO SP-32: 2874)	• Name (English) • Name (national language characters) • Value of local magnetic anomaly	 ✓	✓	✓	✓
Magnetic variation	The angle between the magnetic and geographic (true) north at a location, expressed in degrees east or west from the direction of true north.	• End date • Reference year for magnetic variation • Start date • Value of annual change in magnetic variation • Value of magnetic variation	 ✓ ✓ ✓	✓	✓	✓

Feature Class	Description	Associated Attributes		Form		
		Description	M	P	L	A
Marine farm / culture	An assemblage of cages, nets, rafts, and floats or posts where fish, including shellfish, are artificially cultivated. Also called fish farm. (IHO SP-32: 1811)	• Category of marine farm / culture • Depth of water over feature • Depth units • End date • Exposition of sounding • Height / length units • Name (English) • Name (national language characters) • Quality of sounding measurement • Restriction(s) • Seasonal start date • Seasonal end date • Sounding accuracy • Sounding datum • Start date • Status • Vertical datum • Vertical length • Water level effect		✓	✓	✓
Marine Safety Information area	An area or region providing details of some form of maritime safety information. (AML)	• Category of maritime safety information • Contact details • Name (English) • Name (national language characters) • Nationality	✓			✓

Feature Class	Description	Associated Attributes		Form		
		Description	M	P	L	A
Obstruction	In marine navigation, anything that hinders or prevents movement, particularly anything that endangers or prevents passage of a vessel. (IHO Dictionary, S-32, 5th Edition, 3503) *(Note: only obstructions of a general nature, as defined in the attribute* 'Category of obstruction' *shall be captured, providing they cover a significant area of the seabed. Any type of obstruction which can be positioned using a single co-ordinate, or can be adequately represented by a centralised position (point geometry) must be captured in either the AML product "Large Bottom Objects" or "Small Bottom Objects" as appropriate.)*	• Category of obstruction • Condition • Depth of water over feature • Depth units • Exposition of sounding • Height • Height / length units • Nature of construction • Name (English) • Name (national language characters) • Quality of sounding measurement • Sounding accuracy • Sounding datum • Status • Vertical length • Water level effect	✓		✓	✓
Offshore platform	A permanent offshore platform, either fixed or floating, used in the production of oil or natural gas. (IHO SP-32: 3895)	• Category of offshore platform • Condition • Conspicuous, radar • Controlling authority • End date • Height • Height / length units • Limits of anchors and chains • Name (English) • Name (national language characters) • Nationality • Nature of construction • Product • Start date • Status • Vertical datum	✓	✓		✓

Feature Class	Description	Associated Attributes		Form		
		Description	M	P	L	A
Offshore production area	An area at sea within which there are production facilities.	• Category of production area • Condition • Conspicuous, radar • Controlling authority • End date • Height • Height / length units • Name (English) • Name (national language characters) • Nationality • Product • Restriction(s) • Start date • Status • Vertical datum	✓			✓
Pipeline area	An area containing one or more pipelines.	• Category of pipeline • Condition • End date • Name (English) • Name (national language characters) • Product • Restriction(s) • Start date • Status		✓		✓

Feature Class	Description	Associated Attributes		Form		
		Description	M	P	L	A
Pipeline, submarine / on land	A pipeline is a string of interconnected pipes used for the transport of matter, nowadays mainly oil or gas. (IHO Dictionary, S-32, 5th Edition, 3857) A submarine or land pipeline is a pipeline lying on or buried under the seabed or the land. (AML)	• Buried depth • Category of pipeline • Condition • Depth range – shoalest value • Depth range – deepest value • Depth units • End date • Height and length units • Name (English) • Name (national language characters) • Product • Restriction(s) • Sounding accuracy • Sounding datum • Start date • Status • Vertical length		✓	✓	
Production / storage area	An area on land for the exploitation or storage of natural resources.	• Category of production area • Condition • Conspicuous, radar • Conspicuous, visually • End date • Elevation • Height • Height / length units • Name (English) • Name (national language characters) • Product • Start date • Status • Vertical datum • Vertical length	✓	✓		✓
Radio broadcast area	The area in which a radio transmission from a radio station is likely to be received. (AML)	• Name (English) • Name (national language characters)				✓

Feature Class	Description	Associated Attributes		Form		
		Description	M	P	L	A
Radio station	A place equipped to transmit radio waves. Such a station may be either stationary or mobile, and may also be provided with a radio receiver. In British terminology, also called w/t station. (IHO Dictionary, S-32, 5th Edition, 4191)	• Call sign • Category of radio station • Communication channel • End date • Estimated range of transmission • Name (English) • Name (national language characters) • Orientation • Seasonal start date • Seasonal end date • Signal frequency • Start date • Status	✓	✓		
Rescue station	A place at which life saving equipment is held. (IHO Chart Specifications, M-4)	• Category of rescue station • End date • Name (English) • Name (national language characters) • Seasonal start date • Seasonal end date • Start date • Status	✓	✓		
Sea area	A geographically defined part of the sea or other navigable waters. It may be specified within its limits by its proper name. (S-57 Annex A, Appendix A, Chapter 2 Attributes)	• Name (English) • Name (national language characters)	✓	✓		✓
Seismic activity area	Area where earthquake activity has taken place. (AML)	• Bearing • Strength according to Richter Scale				✓
Signal station, warning	A signal station is a place on shore from which signals are made to ships at sea. (IHO Dictionary, S-32, 5th Edition, 4742)	• Category of signal station, warning • Name (English) • Name (national language characters) • Status	✓	✓		

Feature Class	Description	Associated Attributes		Form		
		Description	M	P	L	A
Tidal stream - flood / ebb	Tide - the periodic rise and fall of the surface of the sea, due principally to the gravitational interaction between moon, sun and earth. (Adapted from IHO Dictionary, S-32, 5th Edition, 5429). A tidal stream (or tidal current) is an alternating horizontal movement of water associated with the rise and fall of the tide caused by tide-producing forces. (IHO Dictionary, S-32, 5th Edition, 1169). Approximate tidal stream rates may be given as discrete rate values for flood and ebb flow during springs. (AML)	• Category of tidal stream • Current velocity • End date • Name (English) • Name (national language characters) • Orientation • Seasonal start date • Seasonal end date • Start date	✓ ✓ ✓ 	✓		✓
Tidal stream panel data	Approximate tidal stream rates may be given as discrete rate values at a specified interval before or after a high water.	• Name (English) • Name (national language characters) • Tidal stream – panel values	 ✓	✓		✓
Tidal stream - harmonic prediction	Predicted tidal stream rates may be calculated using parameters (harmonic constituents) and an appropriate harmonic calculation algorithm.	• Name (English) • Name (national language characters) • Tide – method of tidal prediction • Tide – value of harmonic constituents • Status	 ✓ ✓ 	✓		✓
Tidal stream - non-harmonic prediction	Predicted tidal stream rates may be calculated using time and height differences with respect to a reference station (and associated tidal stream predictions).	• Name (English) • Name (national language characters) • Tide – method of tidal prediction • Tide – time and height differences • Status	 ✓ ✓ 	✓		✓

Feature Class	Description	Associated Attributes		Form		
		Description	M	P	L	A
Tidal stream – time series	Tidal stream rates over time may be approximated by a series of rate values given at regular time intervals, starting from a specified moment in time.	• Name (English) • Name (national language characters) • Tide, current – time interval of values • Tidal stream current – time series values • Time end • Time start • Status	 √ √ √ √	√		√
Tide – harmonic prediction	Predicted tidal heights may be calculated using parameters (harmonic constituents) and an appropriate harmonic calculation algorithm.	• Name (English) • Name (national language characters) • Tide – accuracy of water level • Tide – method of tidal prediction • Tide – value of harmonic constituents • Status	 √ √ 	√		√
Tide – non-harmonic prediction	Predicted tidal heights may be calculated using time and height differences with respect to a reference port (and associated tidal predictions).	• Name (English) • Name (national language characters) • Tide – accuracy of water level • Tide – method of tidal prediction • Tide – time and height differences • Status	 √ √ 	√		√
Tide – time series	Tidal heights over time may be approximated by a series of rate values given at regular time intervals, starting from a specified moment in time.	• Name (English) • Name (national language characters) • Tide – accuracy of water level • Tide – high and low water levels • Tide, current – time interval of values • Tide – time series values • Time end • Time start • Status	 √ √ √ 	√		√

Feature Class	Description	Associated Attributes		Form		
		Description	M	P	L	A
Traffic route	A commonly used route by commercial shipping which is not a Traffic Separation Scheme or Deep Water Route. (AML)	• Interpolated line characteristic • Name (English) • Name (national language characters) • Seasonal start date • Seasonal end date • Traffic density • Traffic flow • Type of shipping			✓	
Traffic separation line	A traffic separation scheme is a scheme which aims to reduce the risk of collision in congested and/or converging areas by separating traffic moving in opposite, or nearly opposite, directions. (IHO Dictionary, S-32, 5th Edition, 5585) A traffic separation line is a line separating traffic lanes in which ships are travelling in opposite or nearly opposite directions; or separating traffic lanes designated for particular classes of ships proceeding in the same direction (IMO Ships Routeing, 6th Edition)	• Category of traffic separation scheme • End date • Interpolated line characteristic • Start date • Status			✓	
Traffic separation scheme boundary	A traffic separation scheme is a scheme which aims to reduce the risk of collision in congested and/or converging areas by separating traffic moving in opposite, or nearly opposite, directions. (IHO Dictionary, S-32, 5th Edition, 5585) The boundary of a traffic separation scheme is the outer limit of a traffic lane part or a traffic separation scheme roundabout. (AML)	• Category of traffic separation scheme • End date • Interpolated line characteristic • Start date • Status			✓	
Traffic separation scheme composite	A composite feature which enables the components of a traffic separation scheme to be combined into a single feature. (AML)	• Name (English) • Name (national language characters)		No geometry required		

Feature Class	Description	Associated Attributes		Form		
		Description	M	P	L	A
Traffic separation scheme crossing	A traffic separation scheme is a scheme which aims to reduce the risk of collision in congested and/or converging areas by separating traffic moving in opposite, or nearly opposite, directions. (IHO Dictionary, S-32, 5th Edition, 5585) A traffic separation scheme crossing is a defined area where traffic lanes cross. (AML)	• Category of traffic separation scheme • End date • Restriction(s) • Start date • Status				✓
Traffic separation scheme lane part	A traffic separation scheme is a scheme which aims to reduce the risk of collision in congested and/or converging areas by separating traffic moving in opposite, or nearly opposite, directions. (IHO Dictionary, S-32, 5th Edition, 5585) A traffic lane is an area within defined limits in which one-way traffic flow is established (IMO Ships Routeing, 6th Edition). A traffic separation scheme lane part is an area of a traffic lane in which the direction of flow of traffic is uniform. (AML)	• Category of traffic separation scheme • End date • Interpolated line characteristic • Orientation • Restriction(s) • Start date • Status	✓			✓
Traffic separation scheme roundabout	A traffic separation scheme is a scheme which aims to reduce the risk of collision in congested and/or converging areas by separating traffic moving in opposite, or nearly opposite, directions. (IHO Dictionary, S-32, 5th Edition, 5585) A roundabout is a traffic separation scheme in which traffic moves in a counter-clockwise direction around a specified point or zone. (IHO Dictionary S-32, 5th Edition, 4448)	• Category of traffic separation scheme • End date • Restriction(s) • Start date • Status				✓

Feature Class	Description	Associated Attributes		Form		
		Description	M	P	L	A
Traffic separation zone	A traffic separation scheme is a scheme which aims to reduce the risk of collision in congested and/or converging areas by separating traffic moving in opposite, or nearly opposite, directions. (IHO Dictionary, S-32, 5th Edition, 5585) A traffic separation zone is a zone separating the lanes in which ships are proceeding in opposite or nearly opposite directions; or separating traffic lanes designated for particular classes of ships proceeding in the same direction. (IMO Ships Routeing, 6th Edition)	• Category of traffic separation scheme • End date • Start date • Status				✓
Vertical Datum Shift Area	An area within which a uniform shift exists between a specific vertical datum and the datum of the data within this area. (AML)	• Vertical datum shift parameter	✓	✓		✓
Weed / kelp	Seaweed is the general name for marine plants of the Algae class which grow in long narrow ribbons. (Int. Mar. Dictionary 2nd Ed.) Kelp is one of an order (laminariales) of usually large, blade-shaped or vine-like brown algae. (IHO Dictionary, S-32, 5th Edition, 2611)	• Category of weed / kelp • Name (English) • Name (national language characters)		✓		✓

5.5.2.1 Mandatory Features

Real-world objects that are mandatory for this product are:

- Coastline

5.5.3 Attributes

The table below displays the following information:

- Attribute – gives the name of attribute.
- Definition – gives a more detailed description of the attribute if required.
- Values – specifies the possible values the attribute may take if appropriate.

For details of how to encode the attributes listed in this section, refer to the appropriate exchange standard implementation annex.

ANNEX A	A.2.4.3

Attribute	Definition	Values
Absolute horizontal accuracy	The positional error estimate for a single point, relative to the specified spatial reference system.	Value: min 0 Units: metres or feet (units must be defined) Resolution: 0.1 (metres or ft)
Absolute vertical accuracy	The vertical error estimate for a single point, relative to the specified spatial reference system.	Value: min 0 Units: metres or feet (units must be defined) Resolution: 0.1 (metres or ft)
Bearing	The horizontal direction of one terrestrial point from another, expressed as the angular distance from a reference direction. (IHO Dictionary, S-32, 5th Edition, 435)	Value: 0.00° - 359.99° Units: degree (°) Resolution: 0.01
Buried depth	The depth below the sea bed to which an object is buried. (S-57 Annex A, Appendix A, Chapter 2 Attributes)	Value: 0 - 99.9 Units: metres or feet (units must be defined) Resolution: 0.1
Call sign	The designated call sign of a radio station.	Text string
Capture date	Gives the date when the object was captured, edited or deleted.	CCYYMMDD The date should be encoded using 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD).
Category of administration area	Category of administration area.	• **port**: A place provided with terminal and transfer facilities for loading and discharging cargo or passengers, usually located in a harbour. (IHO SP-32, Ed5: 3950) • **territorial land area:** A region or portion of land belonging to a state or confederation; a district over which an authority extends. (Adapted from Chambers Concise Dictionary)

Attribute	Definition	Values
Category of cardinal mark	Category of cardinal mark.	• **north cardinal mark.** • **south cardinal mark.** • **east cardinal mark.** • **west cardinal mark.**
Category of coastguard station	Category of coastguard station.	• **maritime rescue co-ordination centre**: a unit responsible for promoting efficient organization of search and rescue services and for co-ordinating the conduct of search and rescue operations within a search and rescue region. • **maritime rescue subcentre**: a unit subordinate to a rescue co-ordination centre, established to complement the latter according to particular provisions of the responsible authorities.
Category of conformance	Indicates the inclusion criteria and completeness regarding the feature class content of the dataset.	• **complete:** the area specified has been populated for all feature classes. Absence of features from any class indicates that there are no such entities • **partial:** certain feature classes have not been included (or only partially included) within the specified area. Details **must** be provided in supporting textual information
Category of coverage	The availability of coverage.	• **coverage available:** continuous coverage of spatial objects is available within this area • **no coverage available:** an area containing no spatial objects
Category of ferry	Category of ferry	• **'free-moving' ferry**: a ferry which may have routes that vary with weather, tide and traffic. (adapted from M-4) • **cable ferry**: a ferry that follows a fixed route guided by a cable. (adapted from M-4) • **ice ferry**: a winter-time ferry which crosses a lead. (Finnish Maritime Administration)
Category of fishing facility	Category of fishing facility.	• **fishing stake**: a pole or stake placed in shallow water to outline a fishing ground or to catch fish (IHO Dictionary, S-32, 5th Edition, 1818). • **fish trap**: a structure (usually portable) for catching fish (IHO Dictionary, S-32, 5th Edition, 1819). • **fish weir**: a fence of stakes or stones set in a river or along the shore to trap fish (IHO Dictionary, S-32, 5th Edition, 5967). • **tunny net**: a net built at sea for catching tunny (IHO Dictionary, S-32, 5th Edition, 5700).

Attribute	Definition	Values
Category of harbour facility	Category of harbour facility.	• **ro-ro terminal**: a terminal for roll-on roll-off ferries. • **ferry terminal**: a terminal for passenger and vehicle ferries. • **fishing harbour**: a harbour with facilities for fishing boats. • **yacht harbour / marina**: a harbour with facilities for small boats and yachts (IHO Dictionary, S-32, 5th Edition, 3095). • **naval base**: a centre of operations for naval vessels (adapted from The Collins Dictionary). • **tanker terminal**: a terminal for the bulk handling of liquid cargoes. • **passenger terminal:** a terminal for the loading and unloading of passengers. • **container terminal**: a terminal for container ships. • **bulk terminal**: a terminal for the handling of bulk materials such as iron ore, coal, etc.
Category of installation buoy	Category of installation buoy.	• **catenary anchor leg mooring (CALM)**: incorporates a large buoy which remains on the surface at all times and is moored by 4 or more anchors. Mooring hawsers and cargo hoses lead from a turn-table on top of the buoy, so that the buoy does not turn as the ship swings to wind and stream. • **single buoy mooring (SBM):** a mooring structure used by tankers to load and unload in port approaches or in offshore oil and gas fields. The size of the structure can vary between a large mooring buoy and a manned floating structure. Also known as single point mooring (SPM). (IHO Dictionary, S-32, 4th Edition)

Attribute	Definition	Values
Category of lateral mark	Category of lateral mark.	• **port-hand lateral mark**: indicates the port boundary of a navigational channel or suggested route when proceeding in the 'conventional direction of buoyage'. • **starboard-hand lateral mark**: indicates the starboard boundary of a navigational channel or suggested route when proceeding in the 'conventional direction of buoyage'. • **preferred channel to starboard lateral mark**: at a point where a channel divides, when proceeding in the 'conventional direction of buoyage', the preferred channel (or primary route) is indicated by a modified port-hand lateral mark. • **preferred channel to port lateral mark**: at a point where a channel divides, when proceeding in the 'conventional direction of buoyage', the preferred channel (or primary route) is indicated by a modified starboard-hand lateral mark.
Category of light	Category of light.	• **directional function**: a light illuminating a sector of very narrow angle and intended to mark a direction to follow. (IHO Dictionary, S-32, 5th Edition, 2778) • **leading light**: a light associated with other lights so as to form a leading line to be followed. (adapted from IHO Dictionary, S-32, 5th Edition, 2794) • **aero light**: an aero light is established for aeronautical navigation and may be of higher power than marine lights and visible from well offshore. (M-4, 476.1) • **air obstruction light**: a light marking an obstacle which constitutes a danger to air navigation. (IHO Dictionary, S-32, 5th Edition, 2767) • **fog detector light**: a light used to automatically determine conditions of visibility which warrant the turning on or off of a sound signal. (IHO Dictionary, S-32, 5th Edition, 1885) • **flood light**: a broad beam light used to illuminate a structure or area. (adapted from The Collins Dictionary) • **subsidiary light**: a light placed on or near the support of a main light and having a special use in navigation. (ALRS) • **spotlight**: a powerful light focused so as to illuminate a small area. (The Collins Dictionary)

Attribute	Definition	Values
Category of light *(continued)*	Category of light.	• **front, rear, upper, lower**: terms used with leading lights to describe the position of the light on the lead as viewed from seaward. • **emergency light**: a light available as a back-up to a main light which will be illuminated should the main light fail. • **bearing light**: a light which enables its approximate bearing to be obtained without the use of a compass. (M-4, 478.1) • **horizontally disposed**: a group of lights of identical character and almost identical position, that are disposed horizontally. • **vertically disposed**: a group of lights of identical character and almost identical position, that are disposed vertically.
Category of marine farm/culture	Category of marine farm/ culture.	• **crustaceans**: hard shelled animals for example crabs or lobsters. • **oysters / mussels**: edible bivalve molluscs. • **fish**: a vertebrate cold blooded animal with gills, living in water. • **seaweed**: the general name for marine plants of the Algae class which grow in long narrow ribbons. (Int. Mar. Dictionary 2nd Ed.) • **pearl culture farm:** an area where pearls are artificially cultivated.
Category of maritime safety information	Category of maritime safety information.	• **search and rescue region**: the area of responsibility for a rescue co-ordination centre. • **GMDSS area**: global maritime distress and safety system area. • **forecast area**: specified regions for the receipt of meteorological forecasts. • **INMARSAT coverage**: INternational Mobile SATellite Organization. Coverage of the satellites. • **MilSat coverage**: coverage of a military satellite.

Attribute	Definition	Values
Category of obstruction	Category of obstruction.	• **fish haven**: areas established by private interests, usually sport fishermen, to simulate natural reefs and wrecks that attract fish. The reefs are constructed by dumping assorted junk in areas which may be of very small extent or may stretch a considerable distance along a depth . Also called fishery reefs. (S-57 Appendix A, Chapter 2 Attributes) • **foul area**: an area of numerous unidentified dangers to navigation. The area serves as a warning to the mariner that all dangers are not identified individually and that navigation through the area may be hazardous. Commonly used to encode areas behind danger lines on navigation charts. (S-57 Appendix A, Chapter 2 Attributes) • **foul ground**: areas over which it is safe to navigate but which should be avoided for anchoring, taking the ground or ground fishing. (S-57 Appendix A, Chapter 2 Attributes) • **ground tackle**: equipment such as anchors, concrete blocks, chains and cables etc., used to position floating structures such as trot and mooring buoys etc. (S-57 Appendix A, Chapter 2 Attributes)
Category of offshore platform	Category of offshore platform.	• **oil derrick / rig**: a temporary mobile structure, either fixed or floating, used in the exploration stages of oil and gas fields. (IHO Dictionary, S-32, 5th Edition, • **production platform**: a term used to indicate a permanent offshore structure equipped to control the flow of oil or gas. It does not include entirely submarine structures. (IHO Dictionary, S-32, 5th Edition, 4037) • **observation / research platform**: a platform from which one's surroundings or events can be observed, noted or recorded such as for scientific study. (adapted from IHO Dictionary, S-32, 5th Edition, 3493/3500) • **articulated loading platform (ALP):** a metal lattice tower, buoyant at one end and attached at the other by a universal joint to a concrete filled base on the sea bed. The platform may be fitted with a helicopter platform, emergency accommodation and hawser/hose retrieval. (adapted from UKHO CSDO 607.2 (12), May 1994)

Attribute	Definition	Values
Category of offshore platform *(continued)*	Category of offshore platform.	• **single anchor leg mooring (SALM):** a rigid frame or tube with a buoyancy device at its upper end , secured at its lower end to a universal joint on a large steel or concrete base resting on the sea bed, and at its upper end to a mooring buoy by a chain or wire. (adapted from UKHO CSDO 607.2 (12), May 1994) • **mooring tower**: a platform secured to the sea bed and surmounted by a turn-table to which ships moor. (adapted from UKHO CSDO 607.2 (12), May 1994) • **artificial island**: a man-made structure usually built for the exploration or exploitation of marine resources, marine scientific research, tidal observations, etc. (adapted from IHO Dictionary, S-32, 5th Edition, 240) • **floating production, storage and offloading vessel (FPSO):** an offshore oil/gas facility consisting of a moored tanker/barge by which the product is extracted, stored and exported. (adapted from UKHO CSDO 607.2 (13), May 1994) • **accommodation platform**: a platform used primarily for eating, sleeping and recreation purposes. • **navigation, communication and control buoy (NCCB):** a floating structure with control room, power and storage facilities, attached to the sea bed by a flexible pipeline and cables.
Category of pipeline	Category of pipeline.	• **outfall pipe**: a pipe (generally a sewer or drainage pipe) discharging in to the sea or a river. • **intake pipe**: a pipe taking water from a river or other body of water, to drive a mill or supply a canal, waterworks, etc. (IHO Dictionary, S-32, 5th Edition, 2468) • **sewer**: a pipe in a sewage system for carrying water or sewage to a disposal area. • **bubbler system**: a submerged pipe from which warm water bubbles, preventing the surrounding water from freezing. • **supply pipe**: a pipe used for supplying of gas or liquid product.

Attribute	Definition	Values
Category of production area	Category of production area.	• **stockpile:** a reserve stock of material, equipment or other supplies. • **power station area**: a stationary plant containing apparatus for large-scale conversion of some form of energy (hydraulic, steam, chemical, nuclear, etc.) into electrical energy. • **refinery area**: a system of process units used to convert crude petroleum into fuels, lubricants and other petroleum derived products. • **factory area**: a group of buildings where goods are manufactured. • **tank farm**: an area in which a number of large-capacity storage tanks are located, generally used for crude oil or petroleum products. • **wind farm**: an area in which numerous wind motors are located. • **slag heap/spoil heap:** hill of refuse from a mine, industrial plant etc. on land (adapted from Concise Oxford Dictionary).
Category of radio station	Category of radio station	• **circular (non-directional) marine or aero-marine radiobeacon**: a radio station which need not necessarily be manned, the emissions of which, radiated around the horizon, enable its bearing to be determined by means of the radio direction finder of a ship. (IHO Dictionary, S-32, 5th Edition, 802) • **directional radiobeacon**: a special type of radiobeacon station the emissions of which are intended to provide a definite track for guidance. (IHO Dictionary, S-32, 5th Edition, 1378) • **rotating pattern radiobeacon**: a special type of radiobeacon station emitting a beam of waves to which a uniform turning movement is given, the bearing of the station being determined by means of an ordinary listening receiver and a stop watch. Also referred to as a rotating loop radiobeacon. (IHO Dictionary, S-32, 5th Edition, 4444) • **consol beacon**: a type of long range position fixing beacon. • **radio direction-finding station**: a radio station intended to determine only the direction of other stations by means of transmission from the latter. (IHO Dictionary, S-32, 5th Edition, 4174)

Attribute	Definition	Values
Category of radio station *(continued)*	Category of radio station.	• **coast radio station providing QTG service**: a radio station which is prepared to provide QTG service, that is to say, to transmit upon request from a ship, a radio signal, the bearing of which can be taken by that ship. (IHO Dictionary, S-32, 5th Edition, 4108) • **aeronautical radiobeacon**: a radio beacon designed for aeronautical use. • **Decca**: the Decca Navigator System is a high accuracy, short to medium range radio navigational aid intended for coastal and landfall navigation. (ALRS, Volume 2, 1994) • **Loran-C**: Loran-C is a low frequency electronic position fixing system using pulsed transmissions at 100 Khz. (ALRS, Volume 2, 1994) • **differential GPS**: a radiobeacon transmitting DGPS correction signals. • **Toran**: Toran is an electronic position fixing system used mainly by aircraft. • **Omega**: Omega is a long-range radio navigational aid which operates within the VLF frequency band. The system comprises eight land based stations. (ALRS, Volume 2, 1994) • **Syledis**: Syledis is a ranging position fixing system operating at 420-450MHz over a range of up to 400Km. • **Chiaka (chayka):** Chiaka is a low frequency electronic position fixing system using pulsed transmissions at 100 Khz. (ALRS, Volume 2, 1995) • **GSM:** Global System for Mobiles. Used as a method of location positioning in conjunction with GPS. • **MSI broadcast station:** station that transmits maritime safety information.

Attribute	Definition	Values
Category of recommended track	Category of recommended track.	• **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 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.
Category of rescue station	The type of equipment or service that may be found at the rescue station. (AML)	• **lifeboat lying at a mooring**: a place where a lifeboat is moored ready or use. (S-57 Appendix A, Chapter 2 Attributes)
Category of signal station, warning	Category of signal station, warning	• **tidal stream**: a signal or message conveying information on condition of tidal currents in the area in question. (IHO Dictionary, S-32, 5th Edition, 4733) • **tide gauge**: a device for measuring the height of tide. A graduated staff in a sheltered area where visual observations can be made; or it may consist of an elaborate recording instrument making a continuous graphic record of tide height against time. Such an instrument is usually actuated by a float in a pipe communicating with the sea through a small hole which filters out shorter waves. (IHO Dictionary, S-32, 5th Edition, 1984)

Attribute	Definition	Values
Category of special purpose mark	Category of special purpose mark.	• **firing danger mark**: a mark used to indicate a firing danger area, usually at sea. • **target mark**: any object toward which something is directed. The distinctive marking or instrumentation of a ground point to aid its identification on a photograph. (Adapted from IHO Dictionary, S-32, 5th Edition, 5309) • **marker ship**: a mark marking the position of a ship which is used as a target during some military exercise. (BSH) • **degaussing range mark**: a mark used to indicate a degaussing range. • **cable mark**: a mark used to indicate the position of submarine cables or the point at which they run on to the land. • **ODAS**: Ocean Data Acquisition System (IHO Dictionary, S-32, 5th Edition, 5953) • **LANBY**: a large buoy designed to take the place of a lightship where construction of an offshore light station is not feasible. (IHO Dictionary, S-32, 5th Edition, 2656) • **notice mark**: a notice board or sign indicating information to the mariner. • **TSS mark**: a mark indicating a traffic separation scheme. • **general warning mark**: a mark indicating that special caution must be exercised in the vicinity of the mark. • **restricted vertical clearance mark**: a mark indicating the minimum vertical space available for passage. • **maximum vessel's draught mark**: a mark indicating the maximum draught of vessel permitted. • **restricted horizontal clearance mark**: a mark indicating the minimum horizontal space available for passage. • **strong current warning mark**: a mark warning of strong currents. • **ferry crossing mark**: a mark indicating that a ferry route crosses the ship route; often used with a 'sound ship's siren' mark. • **pipeline mark**: a mark used to indicate the position of submarine pipelines or the point at which they run on to the land.

Attribute	Definition	Values
Category of special purpose mark *(continued)*	Category of special purpose mark.	• **control mark**: a mark indicating the location at which a restriction or requirement exists. • **diving mark**: a mark indicating that diving may take place in the vicinity. • **foul ground mark**: a mark indicating a foul ground. • **heliport mark**: a mark indicating an area where helicopters may land.
Category of tidal stream	Category of tidal stream.	• **flood stream:** the horizontal movement of water associated with the rising tide. Flood streams generally set towards the shore, or in the direction of the tide progression. Also called flood, flood current or ingoing stream. (Adapted from IHO Dictionary, S-32, 5th Edition) • **ebb stream:** the horizontal movement of water associated with the falling tide. Ebb streams generally set seaward, or in the opposite direction to the tide progression. Also called ebb, ebb current or outgoing stream. (Adapted from IHO Dictionary, S-32, 5th Edition) • **other tidal flow:** any other horizontal movement of water associated with tides, e.g. rotary flow
Category of Traffic Separation Scheme	Category of Traffic Separation Scheme.	• **IMO - adopted**: a defined Traffic Separation Scheme that has been adopted as an IMO routing measure. • **not IMO - adopted**: a defined Traffic Separation Scheme that has not been adopted as an IMO routing measure.
Category of weed / kelp	Category of weed / kelp.	• **kelp**: a giant plant sometimes 60 metres long with no roots, it is anchored by hold-fasts or tendrils up to 10 metres long, that cling to rock. Gas filled bubbles on fronds act as floats keeping the kelp just below the surface. (Earth Sciences References, Mary McNeil) • **sea weed**: general name for marine plants of the algae class which grow in long narrow ribbons. (International Maritime Dictionary, 2nd Edition) • **sea grass**: any grasslike marine alga. Eelgrass is one of the best known sea-grasses. (IHO Dictionary, S-32, 5th Edition, 4565) • **sargasso**: a certain type of sea weed, or more generally, a large floating mass of this sea weed. (IHO Dictionary, S-32, 5th Edition, 4501)

Attribute	Definition	Values
Category of weed / kelp *(continued)*	Category of weed / kelp.	• **kelp**: a giant plant sometimes 60 metres long with no roots, it is anchored by hold-fasts or tendrils up to 10 metres long, that cling to rock. Gas filled bubbles on fronds act as floats keeping the kelp just below the surface. (Earth Sciences References, Mary McNeil) • **sea weed**: general name for marine plants of the algae class which grow in long narrow ribbons. (International Maritime Dictionary, 2nd Edition) • **sea grass**: any grasslike marine alga. Eelgrass is one of the best known sea-grasses. (IHO Dictionary, S-32, 5th Edition, 4565) • **Posidonia:** A flowering marine plant, common in the Mediterranean, found at depths of up to 13m on sandy substrates. (AML)
Caveat	A component of a security classification used for authorising a specific group to have access rights. (AML)	Text string separated from associated values by a comma.

Attribute	Definition	Values
Classification of ice	Classification of ice	• **fast ice**: sea ice which remains fast, generally in the position where originally formed, and which may attain a considerable thickness. It is found along coasts, where it is attached to the shore, or over shoals, where it may be held in position by islands, grounded icebergs or grounded polar ice. (IHO Dictionary, S-32, 5th Edition, 1772) • **sea ice**: any form of ice which has originated from sea water. Generally any ice in the sea. (IHO Dictionary, S-32, 5th Edition, 4566) • **growler**: a low-lying mass of flow ice which is not easily seen by approaching vessels owing to its dark indigo colour. It is therefore a menace to shipping. It is usually caused by the capsizing and disintegration of an iceberg. • **pancake ice**: pieces of new ice, usually approximately circular, about 30 cm to 3 m across, and with raised rims, due to the pieces striking against each other as the result of wind and swell. (IHO Dictionary, S-32, 5th Edition, 3643) • **glacier**: a mass of snow and ice continuously moving from higher to lower ground or, if afloat, continuously spreading. (IHO Dictionary, S-32, 5th Edition, 2041) • **pack ice**: term used in a wide sense to include any area of sea ice, other than fast ice, no matter what form it takes or how it is disposed. (IHO Dictionary, S-32, 5th Edition, 3639) • **polar ice**: sea ice that is more than one year old (in contrast to winter ice). The WMO code defines polar ice as any sea ice more than one year old and more than 3 metres thick. (IHO Dictionary, S-32, 5th Edition, 3928)
Communication channel	A channel number assigned to a specific radio frequency, frequencies or frequency band.	Coded string

Attribute	Definition	Values
Condition	The state of the object where it is not considered to be normal i.e. completed, undamaged or working normally. (S-57 Annex A, Appendix A, Chapter 2 Attributes)	• **under construction**: a structure that is in the process of being built. • **ruined**: a structure in a decayed or deteriorated condition resulting from neglect or disuse, or a damaged structure in need of repair. (IHO Dictionary, S-32, 5th Edition, 4456) • **under reclamation**: an area of the sea that is being reclaimed as land, usually by the dumping of earth and other material. • **planned construction**: an area where a future construction is planned.
Conspicuous, radar	Indicates if the object returns a radar echo. (S-57 Annex A, Appendix A, Chapter 2 Attributes)	• **radar conspicuous**: an object which returns a strong radar echo. (IHO Dictionary, S-32, 5th Edition, 4142) • **not radar conspicuous**: an object which does not return a particularly strong radar echo. • **radar conspicuous (has radar reflector):** an object which returns a strong radar echo, having a radar reflector.
Conspicuous, visually	Indicates if the object is distinctly visible from seaward. (S-57 Annex A, Appendix A, Chapter 2 Attributes)	• **visually conspicuous**: term applied to an object either natural or artificial which is distinctly and notably visible from seaward. (IHO Dictionary, S-32, 5th Edition, 984) • **not visually conspicuous**: an object which is visible from seaward, but is not conspicuous.
Contact details	Contact details including telephone, telex, fax etc.	Text string
Controlling authority	The recognised authority responsible for establishing and maintaining the administrative affairs of all matters relating to a particular field or subject.	Text string
Current velocity	The rate of travel of a non-gravitational current.	Value: 0 - 99.9 Units: knot Resolution: 0.1
Depth of water over feature	Average depth of water over the feature relative to the specified vertical datum. (AML)	Value: min 0 Units: metres; fathoms & feet; feet; fathoms & fractions; fathoms (units must be defined) Resolution: 0.1
Depth range – deepest value	The value of the maximum depth within a defined area.	Value: min 0 Units: metres; fathoms & feet; feet; fathoms & fractions; fathoms (units must be defined) Resolution: 0.1

Attribute	Definition	Values
Depth range – shoalest value	The value of the minimum depth within a defined area.	Value: min 0 Units: metres; fathoms & feet; feet; fathoms & fractions; fathoms (units must be defined) Resolution: 0.1
Depth units	Unit of measurement for depths. (AML)	• **metres:** depths are specified in metres (SI units of length). *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **fathoms and feet:** depths are specified in fathoms (units of six feet of depth) and feet. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **feet:** depths are specified in feet (imperial units of length). *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **fathoms and fractions:** depths are specified in fathoms (units of six feet of depth) and fractions of fathoms. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **fathoms:** a unit of length equal to 6 feet or 1.83 metres. *(AML)*
Elevation	The altitude of the ground level of an object, measured from a specified vertical datum.	Value: 0 - 999.9 Units: metres or feet (units must be defined) Resolution: 0.1
End Date	Indicates the latest date on which an object will be present. (S-57 Annex A, Appendix A, Chapter 2 Arrtibutes)	CCYYMMDD 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD).
Error ellipse	Also known as the Figure of Merit. 95% 2sigma value - semi-major and semi-minor axes of error ellipsoid plus orientation.	**Encoded in triplets:** the semi-major and semi-minor axes and the orientation of the error ellipse.
Estimated range of transmission	The estimated range of a non-optical electromagnetic transmission.	Value: 0 - 999.9 Units: nautical miles Resolution: 0.1
Exposition of sounding	Indicates whether the value of a sounding is shoaler than, deeper than or within the range depth of the surrounding depth area. (FACC)	• **within the range of depth of the surrounding depth area**: the depth corresponds to the depth range of the surrounding depth area. i.e. the depth is not shoaler than the minimum depth of the surrounding depth area or deeper than the maximum depth of the surrounding depth area. • **shoaler than the range of depth of the surrounding depth area**: the depth is shoaler than the minimum depth of the surrounding depth area. • **deeper than the range of depth of the surrounding depth area**: the depth is deeper than the maximum depth of the surrounding depth area.

Attribute	Definition	Values
Height	The value of the vertical distance to the highest point of the object, measured from a specified vertical datum.	Value: 0 - 999.9 Units: metres or feet (units must be defined in dataset metadata) Resolution: 0.1
Image file link	Indicates an external file containing a pictorial representation of the object. (S-57 Annex A, Appendix A, Chapter 2 Attributes)	Text string
International Defence Organisation (IDO) status	The International Defence Organisation (IDO) status (if applicable) that must precede, and be applied to, the Protective Marking thus making it an IDO Marking.	• **North Atlantic Treaty Organisation (NATO)** • **North Atlantic Co-operation Council (NACC)** • **Partnership for Peace (PfP)** • **Western European Union (WEU)**
Interpolated line characteristic	The characteristics of a line used during interpolation between two points.	• **geodesic:** the shortest line on the spheroid joining two points. (Geodesy, G Bomford, 4th Ed. 1980) • **loxodrome:** a line of constant azimuth. (Map Projections, US Geological Survey, J. Snyder, 2nd Ed. 1983)
Jurisdiction	The jurisdiction applicable to an administrative area.	• **international**: involving more than one country; covering more than one national area. • **national**: an area administered or controlled by a single nation. • **national sub-division**: an area smaller than the nation in which it lies. • **NATO**: an area administered or controlled by NATO.
Height / length units	Unit of measurement for heights and lengths. (AML)	• **metres:** depths are specified in metres (SI units of length). (S-57 Annex A, Appendix A, Chapter 2 Attributes) • **feet:** depths are specified in feet (imperial units of length). (S-57 Annex A, Appendix A, Chapter 2 Attributes) • **international nautical mile:** a unit of length equal to 1,852 metres. This value was approved by the International Hydrographic Conference of 1929 and has been adopted by nearly all maritime states. (AML)

Attribute	Definition	Values
Light characteristic	Light characteristic.	• **fixed**: a signal light that shows continuously, in any given direction, with constant luminous intensity and colour. (IHO Dictionary, S-32, 5th Edition, 2780) • **flashing**: a rhythmic light in which the total duration of light in a period is clearly shorter than the total duration of darkness and all the appearances of light are of equal duration. (IHO Dictionary, S-32, 5th Edition, 2783) • **long-flashing**: a flashing light in which a single flash of not less than two seconds duration is regularly repeated. (IHO Dictionary, S-32, 5th Edition, 2796) • **quick-flashing**: a light exhibiting without interruption very rapid regular alternations of light and darkness. (IHO Dictionary, S-32, 5th Edition, 2803) • **very quick flashing**: a flashing light in which flashes are repeated at a rate of not less than 80 flashes per minute but less than 160 flashes per minute. • **ultra quick flashing**: a flashing light in which flashes are repeated at a rate of not less than 160 flashes per minute. • **isophased**: a light with all durations of light and darkness equal. (IHO Dictionary, S-32, 5th Edition, 2779) • **occulting**: a rhythmic light in which the total duration of light in a period is clearly longer than the total duration of darkness and all the eclipses are of equal duration. (IHO Dictionary, S-32, 5th Edition, 2801) • **interrupted quick flashing**: a quick light in which the sequence of flashes is interrupted by regularly repeated eclipses of constant and long duration. (IHO Dictionary, S-32, 5th Edition, 2790) • **interrupted very quick flashing**: a light in which the very rapid alterations of light and darkness are interrupted at regular intervals by eclipses of long duration. (IHO Dictionary, S-32, 5th Edition, 2792) • **interrupted ultra quick flashing**: a light in which the ultra quick flashes (160 or more per minute) are interrupted at regular intervals by eclipses of long duration. (IHO Dictionary, S-32, 5th Edition, 2791)

Attribute	Definition	Values
Light characteristic *(continued)*	Light characteristic.	• **Morse**: a rhythmic light in which appearances of light of two clearly different durations are grouped to represent a character or characters in the Morse code. (IHO Dictionary, S-32, 5th Edition, 2798) • **alternating**: a signal light that shows, in any given direction, two or more colours in a regularly repeated sequence with a regular periodicity. (IHO Dictionary, S-32, 5th Edition, 2770)
Limit of anchors and chains	The radius of a circular area, originating at the object's position or centre, within which the existence of chains and / or anchors are considered to be a hazard. (AML)	Value: 0 - 999.9 Units: metres, feet or international nautical mile (units must be defined in dataset metadata) Resolution: 0.1
Marks – navigational – system of	Marks – navigational – system of.	• **IALA A**: navigational aids conform to the IALA A system. • **IALA B**: navigational aids conform to the IALA B system. • **no system**: navigational aids do not conform to any defined system. • **other system**: navigational aids conform to a defined system other than IALA.
Name (in English)	The principal name or identifier of an object in English.	Text string
Name (in national language characters)	The principal name or identifier of an object in national language characters.	Text string
Nationality	The attribute 'nationality' indicates the nationality of the specific object.	Coded string
Nature of construction	The material(s) used to make the object. (S-57 Annex A, Appendix A, Chapter 2 Attributes)	• **masonry**: constructed of brick or stone. • **concreted**: constructed of concrete, a material made of sand and gravel that is united by cement into a hardened mass used for roads, foundations, etc. (adapted from the Illustrated Contemporary Dictionary, Encyclopaedic Edition, 1978). • **wooden**: constructed from wood. • **metal**: constructed from metal. • **glass reinforced plastic (GRP)**: constructed from a plastic material strengthened with fibres of glass. • **paint**: constructed by the application of paint to some other construction or natural feature.

Attribute	Definition	Values
Orientation	The angular distance measured from true north to the major axis of the object. (DGIWG October 1987)	Value: 0- 359.99 Unit: degree (°) Resolution: 0.01
Owner authority	The NATO country code (NATO STANAG 1059) denoting the 'owner' that is responsible for establishing and setting the protective marking level.	Text string separated from associated values by a comma
Producing country	The country responsible for the production of the data.	Coded String
Product	Indicates the substance(s) which are transported, stored or exploited by the object. (S-57 Annex A, Appendix A, Chapter 2 Attributes)	• **oil**: a thick, slippery liquid that will not dissolve in water, usually petroleum based in the context of storage tanks. • **gas**: a substance with particles that can move freely, usually a fuel substance in the context of storage tanks. • **coal:** a hard black mineral that is burned as fuel. • **ore:** a solid rock or mineral from which metal is obtained. • **chemicals**: any substance obtained by or used in a chemical process. • **bauxite:** a mineral from which aluminium is obtained. • **coke:** a solid substance obtained after gas and tar have been extracted from coal, used as a fuel. • **timber:** wood prepared for use in building or carpentry. • **sawdust / wood chip:** powdery fragments of wood made in sawing timber or coarse chips produced for use in manufacturing pressed board. • **liquefied natural gas (LNG):** a compressed gas consisting of flammable light hydrocarbons and derived from natural gas. • **liquefied petroleum gas (LPG):** a compressed gas consisting of flammable light hydrocarbons and derived from petroleum
Production agency	The agency responsible for the production of the data.	Coded String

Attribute	Definition	Values
Protective marking	A marking indicating the minimum standards of protection required of the data.	• **COSMIC TOP SECRET** • **FOCAL TOP SECRET** • **TOP SECRET** • **SECRET** • **CONFIDENTIAL** • **RESTRICTED** • **UNCLASSIFIED**
Quality of position	An indication of the reliability of a quoted position. (AML) *Note:* *The value 'Approximate', when applied to the attribute 'Quality of Position' is prohibited for use in AML. In circumstances where the term 'Position Approximate' would normally be applied to an object in a standard navigational charting sense, the value 'estimated' should be used.*	• **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 that 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) • **position doubtful:** an object whose position has been reported but which is considered to be doubtful. (S-57 Annex A, Appendix A, Chapter 2 Attributes) • **unreliable:** an object's position obtained from questionable or unreliable data. (S-57 Annex A, Appendix A, Chapter 2 Attributes) • **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. (S-57 Annex A, Appendix A, Chapter 2 Attributes) • **reported (not confirmed):** an object whose position has been reported and its position has not been confirmed. (S-57 Annex A, Appendix A, Chapter 2 Attributes) • **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. (S-57 Annex A, Appendix A, Chapter 2 Attributes) • **calculated:** a position that is computed from data. (S-57 Annex A, Appendix A, Chapter 2 Attributes)

Attribute	Definition	Values
Quality of sounding measurement	Indicates the reliability of the value of the sounding. (S-57 Annex A, Appendix A, Chapter 2 Attributes)	• **depth known:** the depth from chart datum to the bottom is a known value. (S-57 Annex A, Appendix A, Chapter 2 Attributes) • **depth unknown:** the depth from chart datum to the bottom is unknown. (S-57 Annex A, Appendix A, Chapter 2 Attributes) • **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. (S-57 Annex A, Appendix A, Chapter 2 Attributes) • **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 an object 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 an object is unknown, but there is considered to be safe clearance at this depth. (S-57 Annex A, Appendix A, Chapter 2 Attributes) • **value reported (not surveyed):** depth value obtained from a report, but not fully surveyed. (S-57 Annex A, Appendix A, IHO Object Catalogue) • **value reported (not confirmed):** depth Value obtained from a report, which it has not been possible to confirm. (S-57 Annex A, Appendix A, Chapter 2 Attributes)
Reference to a publication	Reference to a specific location of any relevant information within an external publication.	Text string
Reference year for magnetic variation	The reference year for magnetic variation values.	CCYY The date should be encoded using 4 digits for the calendar year (CCYY).
Relative horizontal accuracy	The horizontal error estimate for the distance between two points, or the accuracy of one point with respect to another.	Floating point numeric
Relative vertical accuracy	The vertical error estimate for the distance between two points, or the accuracy of one point with respect to another.	Floating point numeric

Attribute	Definition	Values
Restriction(s)	Specific restrictions regarding entry and / or activities that may / may not be permitted. (AML)	• **anchoring prohibited:** an area within which anchoring is not permitted. • **anchoring restricted:** a specified area designated by appropriate authority, within which anchoring is restricted in accordance with certain specified conditions. • **fishing prohibited**: an area within which fishing is not permitted. • **fishing restricted**: a specified area designated by appropriate authority, within which fishing is restricted in accordance with certain specified conditions. • **trawling prohibited**: an area within which trawling is not permitted. • **trawling restricted**: a specified area designated by appropriate authority, within which trawling is restricted in accordance with certain specified conditions. • **diving prohibited**: an area within which diving is not permitted. • **diving restricted**: a specified area designated by appropriate authority, within which diving is restricted in accordance with certain specified conditions. • **area to be avoided**: an IMO designated area to be avoided, defined as a routeing measure. (adapted from M-4, 435.7)
Seasonal end date	The end of the active period for a seasonal period. (AML)	CCYYMMDD The date should be encoded using 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD).
Seasonal start date	The start of the active period for a seasonal period. (AML)	CCYYMMDD The date should be encoded using 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD).
Signal frequency	The frequency of a signal.	Integer Unit: hertz (Hz) Resolution: 1
Sounding accuracy	The best estimate of the accuracy of the sounding data. The error is assumed to be positive and negative. (S-57 Annex A, Appendix A, Chapter 2 Attributes)	Value: 0 - 99.9 Units: metres, fathoms or feet (units must be defined) Resolution: 0.1

Attribute	Definition	Values
Sounding datum	Indicates the datum to which soundings are referred. (AML)	• **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. (S-57 Annex A, Appendix A, Chapter 2 Attributes) • **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) • **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)

Attribute	Definition	Values
Sounding datum *(continued)*	Indicates the datum to which soundings are referred. (AML)	• **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. (S-57 Annex A, Appendix A, Chapter 2 Attributes) • **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) • **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. (S-57 Annex A, Appendix A, Chapter 2 Attributes) • **lowest astronomical tide (LAT):** the lowest tide level which can be predicted to occur under average meteorological conditions and under any combination of astronomical conditions. (IHO Dictionary, S-32, 5th Edition, 2936)

Attribute	Definition	Values
Sounding datum *(continued)*	Indicates the datum to which soundings are referred. (AML)	• **local datum:** an arbitrary datum defined by a local harbour authority, from which levels and tidal heights are measured by this authority. (S-57 Annex A, Appendix A, Chapter 2 Attributes) • **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. (S-57 Annex A, Appendix A, Chapter 2 Attributes) • **mean water level:** the average of all hourly water levels over the available period of record. (S-57 Annex A, Appendix A, Chapter 2 Attributes) • **lower low water large tide (LLWLT):** the average of the lowest low waters, one from each of 19 years of observations. (S-57 Annex A, Appendix A, Chapter 2 Attributes) • **higher high water large tide (HHWLT):** the average of the highest high waters, one from each of 19 years of observations. (S-57 Annex A, Appendix A, Chapter 2 Attributes) • **nearly highest high water:** an arbitrary level approximating the highest water level observed at a place, usually equivalent to the high water springs. (S-57 Annex A, Appendix A, Chapter 2 Attributes) • **highest astronomical tide (HAT) :** the highest level which can be predicted to occur under average meteorological conditions and under any combination of astronomical conditions. (Adapted from Admiralty Tide Tables.) • **mean tide level (MTL) :** the level mid-way between one or more successive high and low waters. It may be computed by averaging the four tidal levels (MHWS, MHWN, MLWN and MLWS or MHHW, MLHW, MHLW and MLLW) for the place concerned. (UKHO Tidal Branch.)
Source agency	The agency responsible for the production of the source.	Coded string separated from associated values by a comma
Source country	The country responsible for the production of the source.	Coded string separated from associated values by a comma
Source date	The date of issue of the source information, if applicable.	Coded string separated from associated values by a comma CCYYMMDD The date should be encoded using 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD).

Attribute	Definition	Values
Source ID	Any ID of the source (e.g. chart number).	Coded string separated from associated values by a comma
Source scale	The scale at which the source data has been compiled.	Integer
Source type	The type of the source (e.g. chart or report).	Coded string separated from associated values by a comma
Start Date	Indicates the earliest date on which an object will be present. (S-57 Annex A, Appendix A, Chapter 2 Attributes)	CCYYMMDD 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD).
Status	Indicates the condition of the object in terms of permanency or usage. (S-57 Annex A, Appendix A, Chapter 2 Attributes)	• **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) • **private**: not in public ownership or operation. • **mandatory**: compulsory; enforced. (The Concise Oxford Dictionary, 7th Edition) • **extinguished**: no longer illuminated. • **illuminated**: lit by floodlights, strip lights, etc. • **historic:** famous in history; of historic interest. (The Concise Oxford Dictionary, 7th Edition.) • **public:** belonging to, available to, used, or shared by the community as a whole and not restricted to private use. (adapted from The New Shorter Oxford English Dictionary, 1993) • **synchronized**: occur at a time, coincide in point of time, be contemporary or simultaneous. (The New Shorter Oxford English Dictionary, 1993)

Attribute	Definition	Values
Status *(continued)*	Indicates the condition of the object in terms of permanency or usage. (S-57 Annex A, Appendix A, Chapter 2 Attributes)	• **watched**: looked at or observed over a period of time especially so as to be aware of any movement or change. (adapted from The New Shorter Oxford English Dictionary, 1993) • **un-watched**: usually automatic in operation, without any permanently-stationed personnel to superintend it. (adapted from IHO Dictionary, S-32, 5th Edition, 2814) • **existence doubtful**: an object that has been reported but has not been definitely determined to exist.
Strength according to Richter Scale	Strength of seismic activity. (AML)	Integer value in the range 1 to 9.
Supporting textual information (in English)	Supporting (free text) information relevant to the object that cannot be explicitly encoded by any other attribute.	Text string
Supporting textual information (in national language characters)	Supporting (free text) information in national language characters relevant to the object that cannot be explicitly encoded by any other attribute	Text string
Text file reference (in English)	The file name relating to an external text file. (AML)	Text string
Text file reference (in national language characters)	The file name (in national language characters) relating to an external text file. (AML)	Text string
Tidal stream – panel values	Identifies the reference station with reference water level and the direction of the flow and the springs rate from 6 hours before to 6 hours after high water (HW) or low water (LW) at the reference station at hourly intervals.	REFSTA,WL,ddd,v.v,ddd,v.v etc REFSTA: reference station (text string) WL: reference water level and encoded in comma separated pairs ddd: flow direction (degrees) v.v: velocity (knots)
Tidal stream, current – time series values	Values for a direction and velocity time series.	ddd,v.vddd,v.v etc Encoded as comma separated values. ddd: direction (degrees) v.v: velocity (knots)
Tide – accuracy of water level	The accuracy of the water level, comparative to the accuracy of standard port predictions.	• **better than 0.1 m and 10 minutes** • **worse than 0.1 m and 10 minutes**

Attribute	Definition	Values
Tide – high and low water levels	Information on the times and heights of high and low waters for each day of the duration of the time series.	CCYYMMDDThhmm,xxx.x Dates / times and heights should be encoded in pairs, each value separated by a comma. The date should be encoded using 4 digits for the calendar year (CCYY), 2 digits for the month (MM) and 2 digits for the day (DD), separated by a capital T from the hour (hh) and minutes (mm). Height value: 0 - 99.9 Height units: metres Resolution: 0.1
Tide – method of tidal prediction	Tide – method of tidal prediction	• **simplified harmonic method of tidal prediction**: prediction of tidal heights by combining a simplified set of harmonic constituents into a single time/height curve. • **full harmonic method of tidal prediction**: prediction of tidal heights by combining a complete set of harmonic constituents into a single time/height curve. • **time and height difference non-harmonic method**: prediction of high and low water times and heights by modification of the high and low water times and heights of a known time/height curve.
Tide – time and height differences	The time and tidal height or tidal stream rate difference comparative to a reference station.	REFSTA,hhmm,x.x,v.v, REFSTA: reference station (text string) hhmm: time difference (±) x.x: height difference ((-) metres) v.v: rate difference (-) knots)
Tide – time series values	Indicates the values of a time series.	x.x,x.x,x.x,x.x etc x.x ± height (metres)
Tide – value of harmonic constituents	Harmonic constituents are the harmonic elements in a mathematical expression for the tide producing force and in the corresponding formula for the tidal curve. Each constituent represents a periodic change or variation in the relative positions of the earth, moon and sun.	A table defined by comma separated values which define the following: number of columns, number of rows, column headings, row headings, cell values.
Tide, current – time interval of values	Indicates the interval between the values in any time series i.e. tidal, current or other data.	mm.m,mm.m,mm.m etc mm.m time interval (minutes)
Time end	Indicates the end of an active period.	CCYYMMDDThhmmss The date should be encoded using 4 digits for the calendar year (CCYY), 2 digits for the month (MM) and 2 digits for the day (DD), separated by a capital T from the hour (hh), minutes (mm), and seconds(ss).

Attribute	Definition	Values
Time start	Indicates the start of an active period.	CCYYMMDDThhmmss The date should be encoded using 4 digits for the calendar year (CCYY), 2 digits for the month (MM) and 2 digits for the day (DD), separated by a capital T from the hour (hh), minutes (mm), and seconds(ss).
Traffic density	Indicates the density of traffic (AML)	Text string
Traffic flow	An indication of the general traffic flow in relation to, or associated with, the feature. (AML)	• **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.
Type of built-up area	Type of built-up area.	• **urban area**: an area predominantly occupied by man-made structures used for residential, commercial, and industrial purposes. (Nautical Chart Manual, US Department of Commerce, 1992) • **settlement**: a small collection of dwellings in a remote area. • **town**: any considerable collection of dwellings and other buildings larger than a village, but not incorporated as a city. • **city**: a major town inhabited by a large permanent community with all essential services.
Type of cable	Type of cable	• **power line**: a cable used for the supply of electricity. • **telephone**: a cable used for the transmission of telephone signals. • **telegraph**: a cable used for the transmission of telegraph signals. • **data transmission:** a cable used for the transmission of data. • **fibre optic:** a cable comprised of multiple bundles of extremely thin flexible glass, transmitting light by total internal reflection. (Adapted from Chambers Concise Dictionary)
Type of shipping	Indicates the predominant type of shipping (AML)	• **fishing vessels**: definition TBD • **merchants**: definition TBD • **tankers**: definition TBD • **large tankers**: definition TBD • **super tankers**: definition TBD

Attribute	Definition	Values
Value of annual change in magnetic variation	The annual change in magnetic variation values.	sxx.x s: negative sign for west (-) Value: 0.1 - 99.9 Units: minute (′) Resolution: 0.1
Value of local magnetic anomaly	The value of the deviation from the normal magnetic variation.	xx.x Value: 0.1 - 99.9 Units: minute (′) Resolution: 0.1
Value of magnetic variation	The magnetic variation value.	sxx.xx s: negative sign for west (-) Value: 0.1 - 99.99 Units: degree (°) Resolution: 0.01
Value of nominal range	The nominal range at which an object can be seen or a signal detected.	xx.x Value: 0.1 - 99.9 Units: nautical mile Resolution: 0.1
Vertical datum	Vertical datum	• **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)

Attribute	Definition	Values
Vertical datum *(continued)*	Vertical datum.	• **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) • **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. (S-57 Annex A, Appendix A, Chapter 2 Attributes) • **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)

Attribute	Definition	Values
Vertical datum *(continued)*	Vertical datum.	• **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) • **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. (S-57 Annex A, Appendix A, Chapter 2 Attributes) • **lowest astronomical tide (LAT):** the lowest tide level which can be predicted to occur under average meteorological 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. (S-57 Annex A, Appendix A, Chapter 2 Attributes) • **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. (S-57 Annex A, Appendix A, Chapter 2 Attributes) • **mean water level:** the average of all hourly water levels over the available period of record. (S-57 Annex A, Appendix A, Chapter 2 Attributes) • **lower low water large tide (LLWLT):** the average of the lowest low waters, one from each of 19 years of observations. (S-57 Annex A, Appendix A, Chapter 2 Attributes)

Attribute	Definition	Values
Vertical datum *(continued)*	Vertical datum.	• **higher high water large tide (HHWLT):** the average of the highest high waters, one from each of 19 years of observations. (S-57 Annex A, Appendix A, Chapter 2 Attributes) • **nearly highest high water:** an arbitrary level approximating the highest water level observed at a place, usually equivalent to the high water springs. (S-57 Annex A, Appendix A, Chapter 2 Attributes) • **highest astronomical tide (HAT):** the highest level which can be predicted to occur under average meteorological conditions and under any combination of astronomical conditions. (Adapted from Admiralty Tide Tables.) • **mean tide level (MTL) :** the level midway between one or more successive high and low waters. It may be computed by averaging the four tidal levels (MHWS, MHWN, MLWN and MLWS or MHHW, MLHW, MHLW and MLLW) for the place concerned. (UKHO Tidal Branch.)
Vertical datum shift parameter	Shift parameter required to encode the difference between vertical datums. (AML)	Units: metres Resolution: 0.1
Vertical length	The effective vertical length of an object, measured from the highest (lowest) point of the object to either the seabed or the ground (if fixed), or the water level (if floating). (AML)	Value: 0 - 999.9 Units: metres or feet (units must be defined in dataset metadata) Resolution: 0.1

Attribute	Definition	Values
Water level effect	Indicates the effect of the surrounding water on the object. (S-57 Annex A, Appendix A, Chapter 2 Attributes)	• **partly submerged at high water**: partially covered and partially dry at high water. • **always dry**: not covered at high water under average meteorological conditions. • **always under water/submerged**: remains covered by water at all times under average meteorological conditions. • **covers and uncovers**: expression intended to indicate an area of a reef or other projection from the bottom of a body of water which periodically extends above and is submerged below the surface. Also referred to as dries or uncovers. (IHO Dictionary, S-32, 5th Edition, 1111) • **awash**: flush with, or washed by the waves at low water under average meteorological conditions. (adapted from IHO Dictionary, S-32, 5th Edition, 308) • **subject to inundation or flooding**: an area periodically covered by flood water, excluding tidal waters. (Digest 1.2)

5.5.4 Relationships Between Features

5.5.4.1 Feature Dependency

The following table lists the parent-child relationships that exist in AML Maritime Foundation and Facilities.

Parent Feature Class	Child Feature Class
N/A	N/A

5.5.4.2 Feature Association

The following table lists the feature classes in AML Maritime Foundation and Facilities that have an association (i.e. not dependent but linked to provide additional information) with other feature classes.

Feature Class 1	Feature Class 2
Radio station	Radio broadcast area
Tidal stream panel data	Tidal stream - panel values
Tide - time series **or** Tide - harmonic prediction	Tide - non-harmonic prediction
Tidal stream - time series **or** Tidal stream - harmonic prediction	Tidal stream - non-harmonic prediction

6 DATA CAPTURE GUIDELINES

The 'AML Maritime Foundation and Facilities Guidance on Feature Coding and Attribution' provides guidance on the conventions that are to be used to encode features, their geometry, and associated attribution, using a relevant implementation standard.

The content of the AML Maritime Foundation and Facilities is at the discretion of the producing authority, provided that the conventions described in the 'AML Maritime Foundation and Facilities Guidance on Feature Coding and Attribution' are followed.

6.1 CONTINUITY

Features crossing the boundaries of digital source files or other media should be continuous whenever possible. Datasets consisting of multiple digital source files should also aim to be contiguous for consistency of display.

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7 DATA PRESENTATION

7.1 SCOPE

The way in which AML Maritime Foundation and Facilities is displayed is dependent upon an individual customer's requirement. How their systems are developed to display AML Maritime Foundation and Facilities data will largely be governed by the:

- environment in which the data is to be viewed
- types of products that are to be displayed with the AML product

This Product Specification is designed to support the production and supply of Maritime Foundation and Facilities. It does not address data presentation.

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8 PROVISION OF DATA

8.1 GENERAL

8.1.1 File Format (Encapsulation)

The file format or encapsulation is exchange standard specific.

ANNEX A	A.1.1.5

8.1.2 Auxiliary Information

All media containing AML products will contain cataloguing information regarding the coverage of the products contained within it. A complete AML catalogue is planned for future development.

8.2 DISTRIBUTION MEDIA

AML is available in the following format(s):

- **CD-ROM**

Other approved means of distribution will be promulgated in due course. While data must be available to users on standard media, other media/transmission means may be agreed directly between producers and recipients.

8.3 VOLUME NAMING

AML volumes (defined as packages) may contain several datasets, each from a different product specification. The volume naming convention for AML 'Packages' is not defined by AML Product Specifications.

8.4 FILE NAMING

CD-ROM AML file naming conforms to ISO 9660, International Standards Organisation, Information Processing - Volume and File Structure of CD-ROM for Information Interchange.

8.5 DIRECTORY STRUCTURE

CD-ROM The directory structure conforms to ISO 9660, International Standards Organisation, Information Processing - Volume and File Structure of CD-ROM for Information Interchange.

8.6 ERROR DETECTION

Datasets will undergo file integrity checks that are dependent upon the exchange standard implemented.

ANNEX A	A.1.1.9

8.7 COMPRESSION

AML products do not use compression techniques.

8.8 ENCRYPTION

All AML products are unencrypted, irrespective of security classification.

8.9 HARDWARE AND SOFTWARE REQUIREMENTS

N/A.

9 TESTING METHOD

This product specification has been designed to achieve interoperability of AML data products and other digital data products. This is achieved by the separation of the data dictionary from the standard used to encode the data and by the use of internationally recognised standards for the transfer of the data.

It is the responsibility of the data producer to ensure that AML data products fully conform to this Product Specification and to the chosen transfer standard.

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ANNEX A S-57 IMPLEMENTATION OF MARITIME FOUNDATION AND FACILITIES PRODUCT SPECIFICATION

A.1 AML S-57 FORMAT TABLE AND FILE STRUCTURE

A.1.1 GENERAL INFORMATION

The binary implementation of S-57 must be used for AML Maritime Foundation and Facilities using the Chain-Node vector model described in S-57, part 2, Theoretical Data Model.

The application profiles define the structure and content of the catalogue file and data set files in an exchange set.

A.1.1.1 Cells

In order to facilitate the efficient processing of AML data the geographic coverage of a given usage must be split into cells. Each cell of data must be contained in a physically separate, uniquely identified file on the transfer medium, known as a data set file (see section A.1.1.6 and A.1.1.7.3 of this Product Specification).

Cells must be rectangular (i.e. defined by 2 meridians and 2 parallels). It is recommended that the geographic extent of the cell be chosen by the AML producer to ensure that the resulting data set file contains no more than 5 Megabytes of data. Subject to this consideration, the cell size must not be too small in order to avoid the creation of an excessive number of cells.

The co-ordinates of the borders of the cell are encoded in decimal degrees in the catalogue file.

The area within the cell which contains data must be indicated by a meta object M_COVR with CATCOV = 1 (see section A.2.3.1). Any other area not containing data must be indicated by a meta object M_COVR with CATCOV = 2.

Cells of the same scale band (see section 2.2) may overlap. However, data within the cells must not overlap unless the cells are of different security classifications (see section 1.4.2).

Point or line feature objects which are at the border of two cells with the same intended usage must be part of only one cell. They are put in the south or west cell (i.e. north and east borders of the cell are part of the cell, south and west borders are not).

When a feature object exists in several cells its geometry must be split at the cell boundaries and its complete attribute description must be repeated in each cell.

A.1.1.2 Geometry

Edges must be encoded using SG2D fields.

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

In certain circumstances, the symbolisation of an edge may need to be suppressed. This is done using the value {1} in the "Masking Indicator" [MASK] subfield of the "Feature Record to Spatial Record Pointer" [FSPT] field. If the value in the "Usage Indicator" [USAG] subfield is set to {3} (exterior boundary truncated by the data limit), the MASK subfield must be set to {255} (null).

A.1.1.3 Groups

The group (GRUP) sub-field is not used for AML products and the value must be set to {255}null.

A.1.1.4 Language and Alphabet

A.1.1.4.1 Language

The exchange language must be English. Other languages may be used as a supplementary option.

In general this means that, when a national language is used in textual national attributes (NINFOM and NOBJNM), the English translation must exist in the international attributes (INFORM and OBJNAM). However, national geographic names do not need to be translated in the international attributes, they may be left in their original national language form or may be transliterated or transcribed.

A.1.1.4.2 Use of lexical level 2

If the national language cannot be expressed in lexical levels 0 or 1, the following rules apply:

- the exact spelling in the national language is encoded in the "National Attributes" [NATF] field (see sections A.1.2.7.3.4 and A.1.2.8.3.4) using lexical level 2
- translated text, including transliterated or transcribed national geographic names is encoded in the "International Attributes" [ATTF] field (see sections A.1.2.7.3.3 and A.1.2.8.3.3) using lexical level 0 or 1

Where possible, international standards should be used for the transliteration of non-Latin alphabets.

A.1.1.5 Exchange Set

The AML Maritime Foundation and Facilities implements the international standard ISO/IEC 8211 as a means of encapsulating S-57 structured data. The ISO/IEC 8211 standard provides a file based mechanism for the transfer of data from one computer system to another, independent of make. In addition, it is independent of the medium used to establish such a transfer. It permits the transfer of data and the description of how such data is organised.

For a summary of the S-57 implementation of ISO/IEC 8211, refer to S-57 - Part 3: Annex A.

A.1.1.5.1 Content of the Exchange Set

An exchange set is composed of one and only one catalogue file and at least one data set file. Additional files can also be included in the AML exchange set. These files may be included to provide additional information within an AML product.

An exchange set may also contain an optional README file.

Exchange set

|
|--<1>-- README file (see A.1.1.7.1)
|
|--<1>-- Catalogue file (see A.1.2.6)
|
|--<R>-- Data set file (see A.1.1.6)
|
|--<R>-- Text file (see A.1.1.7.4)
|
|--<R>-- Picture file (see A.1.1.7.4)

In tables A.1.1.5.1.1 and A.1.1.5.1.2, all files contained in an Exchange Set (shown in the File Type columns) must be in the formats given in column two of the tables (File Format/Extension). The IMPL subfield values, defined in AML Product Specifications, for the Catalogue Directory field (CATD) are given in the third column (Subfield Value).

A.1.1.5.1.1 Mandatory Exchange Set File Types

The table below provides details of the file types and formats that are mandatory in an AML Exchange Set.

File Type	Implementation	Subfield Value
Catalogue	ASCII	ASC
Data Set	Binary	BIN

A.1.1.5.1.2 Additional Exchange Set File Types

The table below provides examples of the file contents and formats that may be included within an AML Exchange Set.

File Type	File Format/Extension	Subfield Value
Text	TXT	TXT
Picture	TIFF	TIF
Document	PDF	PDF
Document	HTML	HTM
Photo	JPEG	JPG
Video	AVI	AVI
Video	MPEG	MPG

A.1.1.5.2 Exchange Set Naming

All AML products will follow the exchange set naming convention specified in this section.

Format

XXMbcDDD

Where

XX = the two-letter NATO country code of the producer (NATO STANAG 1059)

M = the first character of the three-letter AML product identifier (MFF).

b = identifies whether the exchange set is a base or update exchange set.

B – Base. A base exchange set may contain original base cells, new editions and re-issues. All three are base cell files as defined in section NO TAGNO TAG.

U – Update. An update exchange set will contain update cell files as defined in section A.1.2.8 but may also contain new editions and new base cells.

c = the security classification code:

N – COSMIC TOP SECRET
W – FOCAL TOP SECRET
T – TOP SECRET
S - SECRET
C - CONFIDENTIAL
R - RESTRICTED
U - UNCLASSIFIED

DDD =is the mandatory alphanumeric geographic area identification code. Codes for use in AML are product specific have yet to be defined. Update exchange sets may not require geographical identification in which case this field will be populated with XXX.

A.1.1.5.3 Directory Structure

The following is an example directory structure for an AML Maritime Foundation and Facilities exchange set in MS-DOS format.

Directory of D:\UKMBUDDD

<DIR>			09-15-96	12:40p
<DIR>			09-15-96	12:40p
CATALOG[4]	031	1,584	09-15-96	12:46p CATALOG.031
UKM4U123[1]000		45,584	09-15-96	12:50p UKM4U123.000[3]
UKM4U123[1]001		1,095	09-15-96	12:54p UKM4U123.001
UKM4U123[1]002		1,722	09-15-96	12:54p UKM4U123.002
README[2]TXT		504	09-15-96	12:44p README.TXT
		5 file(s)	49,489 bytes	
		2 dir(s)	1,405,952 bytes free	

Notes:

1. UKM4U123 follows the file naming convention specified in section A.1.1.7 of this Product Specification.

2. The Exchange set directory may also contain a general README file containing ASCII text.

3. For each file in the exchange set the catalogue file must contain the name of the volume on which it is held and the full path name relative to the exchange set directory in that volume. The full path name relative to the exchange set directory must be encoded in the FILE subfield of the "Catalogue Directory" [CATD] field. The LFIL subfield of the CATD field may be used for other purposes. The full path name of the UKM4U123 file shown in the example is UKM4U123.000.

4. The catalogue file must be in the root directory of the exchange set.

A.1.1.6 Data Sets

For each individual AML product, four kinds of data sets may be produced:

- new data set: no AML data has previously been produced for this area for the same purpose, or, at the same security classification
- update: changing some information in an existing data set
- re-issue of a data set: including all the updates applied to the original data set up to the date of the re-issue. A re-issue does not contain any new information additional to that previously issued by updates
- new edition of a data set: including new information which has not been previously distributed by updates

Each new data set, re-issue, or new edition is called a base cell file.

A data set containing updates to one base cell file is called an update cell file.

A.1.1.7 File Naming

AML Maritime Foundation and Facilities will follow the file naming convention specified below.

Format

XXMnc123.eee

Where

XX = the two-letter NATO country code of the producer (NATO STANAG 1059)

M = the first character of the three-letter AML product identifier. As defined, the overall basic AML service would be made up of seven S-57 products:

M – MFF (Maritime Foundation and Facilities)
E – ESB (Environment, Seabed and Beach)
R – RAL (Routes Areas and Limits)
L – LBO (Large Bottom Objects)
S – SBO (Small Bottom Objects)
C – CLB (Contour Line Bathymetry)
I – IWC (Integrated Water Column)

n = 'Usage Band' values and scale ranges for AML. Potential values are given below.
0 - Non-Scaled Information only
1 - < 1:40,000,000
2 - 1: 10,000,000 - 1:62,500,000
3 - 1: 2,000,000 - 1:12,500,000
4 - 1:400,000 - 1: 2,500,000
5 - 1:100,000 - 1:625,000
6 - 1:20,000 - 1:125,000
7 - 1:4,000 - 1:25,000
8 - 1:1,000 - 1:6,250
9 - > 1:1,500

c = the security classification code:
N – COSMIC TOP SECRET
W – FOCAL TOP SECRET
T – TOP SECRET
S - SECRET
C - CONFIDENTIAL
R - RESTRICTED
U - UNCLASSIFIED

123 = product specific alphanumeric identification. This is dependent upon the geographical partitioning of the product and has yet to be fully defined.

eee = extension where 000 is base cell and 001, 002 etc are successive updates.

A.1.1.7.1 README File

The README file is an optional ASCII file of general information.

README.TXT is the mandatory name for this file.

A.1.1.7.2 Catalogue File

The catalogue file acts as the table of contents for the exchange set (see section A.1.1.5.3).

The catalogue file of the exchange set must be named CATALOG.EEE.
Where EEE is the edition number of S-57 used for this exchange set, i.e. 031 for this edition (3.1). No other file may be named CATALOG.

A.1.1.7.3 Data Set Files

Each data set file contains data for one cell (see section A.1.1.1). This includes:

- data set descriptive information that is specific to the data set
- the description and location of the real-world features

A.1.1.7.4 Text and Picture Files

Text and picture files do not conform to ISO/IEC 8211 and are not described in the main body of S-57. These files are specific to this Product Specification (see sections 2.5.5 and A.1.1.5.1.2).

A.1.1.8 Updating

In order to ensure that updates are incorporated in the correct sequence without any omission, the file extension and a number of subfields in the "Data Set Identification" [DSID] field are used in the following way:

file extension — every new data set, re-issue or new edition must have a "000" extension. For update cell files the extension is the number of the update, ranging from "001" to "999". These numbers must be used sequentially, without omission. Number "001" is the first update after a new data set or a new edition, but not after a re-issue. The update sequence is not interrupted by a re-issue. After a re-issue, subsequent updates may be incorporated into the display system created from this re-issue or to the display system created from the original data and kept continuously updated.

edition number — when a data set is initially created, the edition number 1 is assigned to it. The edition number is increased by 1 at each new edition. Edition number remains the same for a re-issue.

update number — update number 0 is assigned to a new data set. The first update cell file associated with this new data set must have update

number 1. The update number must be increased by one for each consecutive update, until a new edition is released. The new edition must have update number 0. A re-issue of a data set must have the update number of the last update applied to the data set. In the case of an update cell file the file extension is the same as the update number.

update application date this date is only used for the base cell files (i.e. new data sets, re-issue, and new edition), not update cell files. All updates dated on or before this date must have been applied by the producer.

issue date date on which the data was made available by the data producer.

Table A.1.1.8.1 gives examples of the way to manage the file extension, the "Edition Number" [EDTN], the "Update Number" [UPDN], the "Update Application Date" [UADT] and the "Issue Date" [ISDT] subfields.

A.1.1.8.1 File Extension and Sub-field Examples

Event	File extension	EDTN	UPDN	UADT	ISDT
New data set	.000	1	0	19950104	19950104
Update 1	.001	1	1	prohibited	19950121
Update 2	.002	1	2	prohibited	19950225
...					
Update 31	.031	1	31	prohibited	19950905
Re-issue of a data set	.000	1	31	19950905	19950910
Update 32	.032	1	32	prohibited	19951023
...					
Update 45	.045	1	45	prohibited	19951112
New edition	.000	2	0	19951201	19951201
Update 1 to edition 2	.001	2	1	prohibited	19960429
...					

This example table relates to the specifications given in S-52 Appendix 1, "Guidance on Updating the Electronic Navigational Chart", in the following way:

- The update information encoded in each individual cell file is called a sequential update.

- The collection of the update information encoded in the update cell files which have been issued since the last new data set, the last re-issue of a data set or since the last update was applied to the display system is called a cumulative update. In the example, the cumulative update for the new data set starts with update number 1. The cumulative update for the re-issue of a data set starts with update number 32. The cumulative update for a data set to which update number n has been applied starts with update number n+1.
- The update information which has been incorporated in a re-issue of a data set is called a compilation update.

Each re-issue or new edition of a data set must have the same name as the base cell file which it replaces.

The update mechanism is described in S-57 Part 3, clause 8.

In order to delete a data set, an update cell file is created, containing only the Data Set General Information record with the "Data Set Identifier" [DSID] field. The "Edition Number" [EDTN] subfield must be set to 0. This message is only used to cancel a base cell file.

To inform the user that a new edition is available, an update cell file is created, containing only the Data Set General Information record with the "Data Set Identifier" [DSID] field. The "Edition Number" [EDTN] subfield must contain a value one higher than the current edition number.

In order to modify a text, picture or application file, a new file with the same name is created.

When an object pointing to a text, picture or application file is deleted or updated so that it no longer references the file, the display system software should check to see whether any other object reference the same file, before that file is deleted.

An exchange set may contain base cell files and update cell files for the same cells. Under these circumstances the update cell files must follow on in the correct sequential order from the last update applied to the base cell file.

The record version of each feature or vector record is indicated in the "Record Version" [RVER] subfield of the "Feature Record Identifier" [FRID] field or the "Vector Record Identifier" [VRID] field. At each update of a record, this version number is incremented by 1.

A.1.1.9 Error Detection

File integrity checks are based on the CRC-32 algorithm (a 32 bit Cyclic Redundancy Check algorithm) as defined in ANSI/IEEE Standard 802.3 (section 1.6.1 refers).

A.1.1.9.1 Implementation

The checksums for each data set are held in the "CRC" [CRCS] subfield of the "Catalogue Directory" [CATD] field. They allow the integrity of each file in the exchange set to be checked on receipt. The CRC value computed on the received file must the same as the CRC value transmitted.

The CRC values are recorded in ASCII as a hexadecimal number most significant byte first.

A.1.1.9.2 Processing

Encoding is defined by the following generating polynomial:

$$G(x) = x^{32} + x^{26} + x^{23} + x^{22} + x^{16} + x^{12} + x^{11} + x^{10} + x^8 + x^7 + x^5 + x^4 + x^2 + x + 1$$

Processing is applied to relevant files as they appear in the exchange set.
The CRC value of the file is defined by the following process:

1. The first 32 bits of the data are complemented.
2. The n bits of the data are then considered to be the coefficients of a polynomial M(x) of degree n-1.
3. M(x) is multiplied by x^{32} and divided by G(x), producing a remainder R(x) of degree<31.
4. The coefficients of R(x) are considered to be a 32-bit sequence.
5. The bit sequence is complemented and the result is the CRC.

The hexadecimal format of CRCs are converted to ASCII characters and stored in the "Catalogue Directory" [CATD] field.

A.1.2 APPLICATION PROFILES

A.1.2.1 General

The binary implementation of S-57 must be used for AML. Therefore, the "Implementation" [IMPL] subfield of the "Catalogue Directory" [CATD] field must be set to "BIN" for the data set files (see section A.1.2.6.1.1).

A.1.2.2 Catalogue and Data Set Files

These files are composed of the records and fields defined in the following tree structure diagrams (see sections A.1.2.6.1, A.1.2.7, and A.1.2.8).

The order of data in each base or update cell file is described below:

Data set file
- Data set general information record
- Data set geographic reference record (for Base application profile)
- Vector records
  - Isolated nodes (SG2D)
  - Connected nodes
  - Edges
- Feature records
  - Meta features
  - Geo features (ordered from slave to master)
  - Collection features

This order of records will enable the import software to check that the child record exists each time the parent record references it (i.e. it will already have read the child record so it will know if it exists or not).

A.1.2.3 Records

Records and fields that do not appear in the following tree structure diagrams are prohibited. The order of records in the files must be the same as that described in the tree structure diagrams. The combination of the file name and the “Name” of the record must provide a unique world-wide identifier of the record.

A.1.2.4 Fields

For base cell files, some fields may be repeated (indicated by <R>) and all of their content may be repeated (indicated by *). In order to reduce the volume of data, the encoder should repeat the sequence of subfields, in preference to creating several fields.

A.1.2.5 Subfields

Mandatory subfields must be filled by a non-null value.

Prohibited subfields must be encoded as missing subfields values (see S-57 Part 3, clause 2.1). The exact meaning of missing attribute values is defined in section A.2.2.

In the tables following the tree structure diagrams, mandatory subfields are shown by “M” in the “use” column and prohibited subfields by “P” in the same column. If there is nothing in this column, it means that the use of this subfield is optional. When a subfield value is prescribed, it is indicated in the “value” column. The “comment” column contains general comments and an indication of whether the subfield is ASCII or binary coded.

A.1.2.6 Catalogue File

The catalogue has the same structure for base and update cell application profiles.

A.1.2.6.1 Catalogue File Structure

Catalogue file

```
  |
  |--<R>--Catalogue Directory record
  |
      |--0001-- ISO/IEC 8211 Record identifier
          |
          |--<1>-- CATD - Catalogue directory field
```

A.1.2.6.1.1 Catalogue Directory Field (CATD)

NB: All subfield values are encoded as ASCII.

tag	subfield name	use	value	comment
RCNM	Record name	M	CD	
RCID	Record identification number	M		
FILE	File name	M		full path name
LFIL	File long name			
VOLM	Volume	M		name of volume on which file appears
IMPL	Implementation	M	Examples ASC BIN TXT TIF PDF HTM JPG AVI MPG	 for the catalogue file for the data set files for ASCII text files (including the README.TXT file) for picture files for document files for document files for photo files for video/film files for video files
SLAT	Southernmost latitude			mandatory for data set files
WLON	Westernmost longitude			mandatory for data set files
NLAT	Northernmost latitude			mandatory for data set files
ELON	Easternmost longitude			mandatory for data set files
CRCS	CRC	M		except for README and catalogue files
COMT	Comment			

A.1.2.7 AML (Base Cell) File Structure

The two letter identifier for AML Maritime Foundation and Facilities base cell application profiles is MN and applies to new data sets, re-issues and new editions of a data set.

Base cell file

```
|
|--<1>--Data Set General Information record
|     |
|     |--0001 - ISO/IEC 8211 Record Identifier
|           |
|           |--<1>-- DSID - Data Set Identification field
|                       |
|                       |--<1>--DSSI - Data Set Structure Information field
|
|     (continued on following page)
```

(continued from previous page)

|--<1>--**Data Set Geographic Reference record**
| |
| |--0001 – ISO/IEC 8211 Record Identifier
| |
| |--<1>--DSPM – Data Set Parameter field
|
|--<R>--**Vector record**
| |
| |--0001 – ISO/IEC 8211 Record Identifier
| |
| |--<1>--VRID – Vector Record Identifier field
| |
| |--<R>--ATTV* – Vector Record Attribute field
| |
| |--<R>--VRPT* – Vector Record Pointer field
| |
| | |--<R>--SG2D* – 2-D Coordinate field
|
|--<R>--**Feature record**
| |
| |--0001 – ISO/IEC 8211 Record Identifier
| |
| |--<1>--FRID – Feature Record Identifier field
| |
| |--<1>--FOID – Feature Object Identifier field
| |
| |--<R>--ATTF* – Feature Record Attribute field
| |
| |--<R>--NATF* – Feature Record National Attribute field
| |
| |--<R>--FFPT* – Feature Record to Feature Object Pointer field
| |
| |--<R>--FSPT* – Feature Record to Spatial Record Pointer field
| |

A.1.2.7.1 Data Set Descriptive (META) Field Content

A.1.2.7.1.1 Data Set Identification Field Structure (DSID)

NB: Subfield values are encoded as ASCII or binary as indicated.

tag	subfield name	use	value	comment
RCNM	Record name	M	{10}	= DS, binary
RCID	Record identification number	M		binary
EXPP	Exchange purpose	M	{1}	data set is new, binary
INTU	Intended usage	M	100 101 102 103 104 105 106 107 108 109	= Unscaled data = < 1:40,000,000 = 1:10,000,000 - 1:62,500,000 = 1: 2,000,000 - 1:12,500,000 = 1: 400,000 - 1:2,500,000 = 1:100,000 - 1:625,000 = 1:20,000 - 1:125,000 = 1:4,000 - 1:25,000 = 1:1,000 - 1:6,250 = > 1:1,500 *Note: Scales are approximate*
DSNM	Data set name	M		file name with extension excluding path, ASCII
EDTN	Edition number	M		Refer to section A.1.1.8
UPDN	Update number	M		ASCII
UADT	Update application date	M		ASCII
ISDT	Issue date	M		ASCII
STED	Edition number of S-57	M	03.1	ASCII
PRSP	Product specification	M	51	= Maritime Foundation and Facilities
PSDN	Product specification description	M	Additional Military Layers Maritime Foundation and Facilities	
PRED	Product specification edition number	M	1.0	ASCII
PROF	Application profile identification	M	12	= Maritime Foundation and Facilities
AGEN	Producing agency	M		binary
COMT	Comment	M		IDO status Protective marking Owner authority Caveat (Refer to section 5.3.1)

A.1.2.7.1.2 Data Set Structure Information Field Structure (DSSI)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
DSTR	Data structure	M	{2}	= chain node
AALL	ATTF lexical level	M	{0} or {1}	
NALL	NATF lexical level	M	{0}, {1} or {2}	
NOMR	Number of meta records	M		
NOCR	Number of cartographic records	M	{0}	cartographic records are not permitted
NOGR	Number of geo record	M		
NOLR	Number of collection records	M		
NOIN	Number of isolated node records	M		
NOCN	Number of connected node records	M		
NOED	Number of edge records	M		
NOFA	Number of face records	M	{0}	faces are not permitted in chain node structure

A.1.2.7.1.3 Data Set Parameter Field Structure (DSPM)

NB: Subfield values are encoded as ASCII or binary as indicated.

tag	subfield name	use	value	comment
RCNM	Record name	M	{20}	= DP, binary
RCID	Record identification number	M		binary
HDAT	Horizontal geodetic datum	M	{2}	= WGS 84, binary
VDAT	Vertical datum	M		binary
SDAT	Sounding datum	M		binary
CSCL	Compilation scale of data	M		binary
DUNI	Units of depth measurement	M	{1} or {2}	1 =metres, binary 2 = fathoms and feet
HUNI	Units of height measurement	M	{1} or {2}	1 = metres, binary 2 = feet, binary
PUNI	Units of positional accuracy	M	{1}	=metres, binary
COUN	Coordinate units	M	{1}	= lat/long, binary
COMF	Coordinate multiplication factor	M		binary, see S-57 Appendix B.1 clause 4.4
SOMF	3-D (sounding) multiplication factor	M	{10}	binary, see S-57 Appendix B.1 clause 4.4
COMT	Comment	M		ASCII

A.1.2.7.2 Spatial Field Content

A.1.2.7.2.1 Vector Record Identifier Field Structure (VRID)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
RCNM	Record name	M	{110} or {120} or {130}	= VI, isolated node = VC, connected node = VE, edge
RCID	Record identification number	M		
RVER	Record version	M		
RUIN	Record update instruction	M	{1}	= insert

A.1.2.7.2.2 Vector Record Attribute Field Structure (ATTV)

NB: Subfield values are encoded as ASCII or binary as indicated.

tag	subfield name	use	value	comment
ATTL	Attribute label/code	M		binary code for an attribute
ATVL	Attribute value	M		ASCII value. Missing attribute value = attribute is relevant but value is unknown.

A.1.2.7.2.3 Vector Record Pointer Field Structure (VRPT)

NB: Subfield values are encoded as ASCII or binary as indicated.

tag	subfield name	use	value	comment
NAME	Name	M		
ORNT	Orientation	M	{255}	= null
USAG	Usage indicator	M	{255}	= null
TOPI	Topology indicator	M	{1} or {2}	= beginning node = end node
MASK	Masking indicator	M	{255}	= null

A.1.2.7.2.4 2-D Coordinate Field Structure(SG2D)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
YCOO	Coordinate in Y axis	M		latitude (see S-57 Appendix B.1 clause 4.4)
XCOO	Coordinate in X axis	M		longitude (see S-57 Appendix B.1 clause 4.4)

A.1.2.7.3 Feature Field Content

A.1.2.7.3.1 Feature Record Identifier Field Structure (FRID)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
RCNM	Record name	M	{100}	= FE
RCID	Record identification number	M		
PRIM	Object geometric primitive	M	{1} or {2} or {3} or {255}	= point = line = area = no geometry
GRUP	Group	M	{255}	= null
OBJL	Object label	M		binary code for an object class
RVER	Record version	M		
RUIN	Record update instruction	M	{1}	= insert

A.1.2.7.3.2 Feature Object Identifier Field Structure (FOID)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
AGEN	Producing agency	M		
FIDN	Feature identification number	M		
FIDS	Feature identification subdivision	M		

A.1.2.7.3.3 Feature Record Attribute Field Structure (ATTF)

NB: Subfield values are encoded as ASCII or binary as indicated.

tag	subfield name	use	value	comment
ATTL	Attribute label/code	M		binary code for an attribute
ATVL	Attribute value			ASCII value. Missing attribute value = attribute is relevant but value is unknown.

A.1.2.7.3.4 Feature Record National Attribute Field Structure (NATF)

NB: Subfield values are encoded as ASCII or binary as indicated.

tag	subfield name	use	value	comment
ATTL	Attribute label/code	M		binary code for an attribute
ATVL	Attribute value			ASCII value. Missing attribute value = attribute is relevant but value is unknown

A.1.2.7.3.5 Feature Record to Feature Object Pointer Field Structure (FFPT)

NB: Subfield values are encoded as ASCII or binary as indicated.

tag	subfield name	use	value	comment
LNAM	Long name	M		binary
RIND	Relationship indicator	M	{2} or {3}	= slave, binary = peer, binary
COMT	Comment			ASCII

A.1.2.7.3.6 Feature Record to Spatial Pointer Field Structure (FSPT)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
NAME	Name	M		
ORNT	Orientation	M	{1} or {2} or {255}	= forward = reverse = null
USAG	Usage indicator	M	{1} or {2} or {3} or {255}	= exterior = interior = exterior boundary, truncated by the data limit = null
MASK	Masking indicator	M	{1} or {2} or {255}	= mask = show = null

A.1.2.8 AML (Update) File Structure

The two letter identifier for AML Maritime Foundation and Facilities update cell application profiles is MR and applies to updates to a data set.

Update cell file

```
|
|--<1>--Data Set General Information record
|     |
|     |--0001 - ISO/IEC 8211 Record Identifier
|           |
|           |--<1>--DSID - Data Set Identification field
|                       |
|                       |--<1>--DSSI - Data Set Structure Information field
|
|     (continued on following page)
```

(continued from previous page)

- <R> **Vector record**
  - 0001 – ISO/IEC 8211 Record identifier
  - <1> VRID – Vector Record Identifier field
    - <R> ATTV* – Vector Record Attribute field
    - <1> VRPC – Vector Record Pointer Control field
    - <R> VRPT* – Vector Record Pointer field
    - <1> SGCC – Coordinate Control field
      - <R> SG2D* – 2-D Coordinate field

- <R> **Feature record**
  - 0001 – ISO/IEC 8211 Record Identifier
  - <1> FRID – Feature Record Identifier field
    - <1> FOID – Feature Object Identifier field
    - <R> ATTF* – Feature Record Attribute field
    - <R> NATF* – Feature Record National Attribute field
    - <R> FFPC – Feature Record to Feature Object Pointer Control field
    - <R> FFPT* – Feature Record to Feature Object Pointer field
    - <R> FSPC – Feature Record to Spatial Record Pointer Control field
    - <R> FSPT* – Feature Record to Spatial Record Pointer field

A.1.2.8.1 Data Set Descriptive (META) Field Content

A.1.2.8.1.1 Data Set Identification Field Structure (DSID)

NB: Subfield values are encoded as ASCII or binary as indicated.

tag	subfield name	use	value	comment
RCNM	Record name	M	{10}	= DS, binary
RCID	Record identification number	M		binary
EXPP	Exchange purpose	M	{2}	data set is a revision, binary
INTU	Intended usage	M	100 101 102 103 104 105 106 107 108 109	= Unscaled data = < 1:40,000,000 = 1:10,000,000 - 1:62,500,000 = 1: 2,000,000 - 1:12,500,000 = 1: 400,000 - 1:2,500,000 = 1:100,000 - 1:625,000 = 1:20,000 - 1:125,000 = 1:4,000 - 1:25,000 = 1:1,000 - 1:6,250 = > 1:1,500 *Note: Scales are approximate*
DSNM	Data set name	M		file name with extension excluding path, ASCII
EDTN	Edition number	M		Refer to section A.1.1.8
UPDN	Update number	M		ASCII
UADT	Update application date	P		empty, ASCII
ISDT	Issue date	M		ASCII
STED	Edition number of S-57	M	03.1	ASCII
PRSP	Product specification	M	51	= Maritime Foundation and Facilities
PSDN	Product specification description	M	Additional Military Layers Maritime Foundation and Facilities	
PRED	Product specification edition number	M	1.0	ASCII
PROF	Application profile identification	M	13	= Maritime Foundation and Facilities
AGEN	Producing agency	M		binary
COMT	Comment	M		IDO status Protective marking Owner authority Caveat (Refer to section 5.3.1)

A.1.2.8.1.2 Data Set Structure Information Field Structure (DSSI)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
DSTR	Data structure	M	{2}	= chain node
AALL	ATTF lexical level	M	{0} or {1}	
NALL	NATF lexical level	M	{0} or {1} or {2}	
NOMR	Number of meta records	M		
NOCR	Number of cartographic records	M	{0}	cartographic records are not permitted
NOGR	Number of geo records	M		
NOLR	Number of collection records	M		
NOIN	Number of isolated node records	M		
NOCN	Number of connected node records	M		
NOED	Number of edge records	M		
NOFA	Number of face records	M	{0}	faces are not permitted in chain node structure

A.1.2.8.2 Spatial Field Content

A.1.2.8.2.1 Vector Record Identifier Field Structure (VRID)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
RCNM	Record name	M	{110} or {120} or {130}	= VI, isolated node = VC, connected node = VE, edge
RCID	Record identification number	M		
RVER	Record version	M		
RUIN	Record update instruction	M	{1} or {2} or {3}	= insert = delete = modify

A.1.2.8.2.2 Vector Record Attribute Field Structure (ATTV)

NB : Subfield values are encoded as ASCII or binary as indicated.

tag	subfield name	use	value	comment
ATTL	Attribute label/code	M		binary code for an attribute
ATVL	Attribute value			ASCII value, missing attribute value = attribute value is deleted or unknown (see S-57 Appendix B.1 clause 3.5.1)

A.1.2.8.2.3 Vector Record Pointer Control Field Structure (VRPC)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
VPUI	Vector record pointer update instruction	M	{1} or {2} or {3}	= insert = delete = modify
VPIX	Vector record pointer index	M		
NVPT	Number of vector record pointers	M		

A.1.2.8.2.4 Vector Record Pointer Field Structure (VRPT)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
NAME	Name	M		
ORNT	Orientation	M	{255}	= null
USAG	Usage indicator	M	{255}	= null
TOPI	Topology indicator	M	{1} or {2}	= beginning node = end node
MASK	Masking indicator	M	{255}	= null

A.1.2.8.2.5 Coordinate Control Field Structure (SGCC)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
CCUI	Coordinate update instruction	M	{1} or {2} or {3}	= insert = delete = modify
CCIX	Coordinate index	M		
CCNC	Number of coordinates	M		

A.1.2.8.2.6 2-D Coordinate Field Structure(SG2D)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
YCOO	Coordinate in Y axis	M		latitude (see S-57 Appendix B.1 clause 4.4)
XCOO	Coordinate in X axis	M		longitude (see S-57 Appendix B.1 clause 4.4)

A.1.2.8.3 Feature Field Content

A.1.2.8.3.1 Feature Record Identifier Field Structure (FRID)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
RCNM	Record name	M	{100}	= FE
RCID	Record identification number	M		
PRIM	Object geometric primitive	M	{1} or {2} or {3} or {255}	= point = line = area = no geometry
GRUP	Group	M	{255}	= null
OBJL	Object label	M		binary code for an object class
RVER	Record version	M		
RUIN	Record update instruction	M	{1} or {2} or {3}	= insert = delete = modify

A.1.2.8.3.2 Feature Object Identifier Field Structure (FOID)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
AGEN	Producing agency	M		
FIDN	Feature identification number	M		
FIDS	Feature identification subdivision	M		

A.1.2.8.3.3 Feature Record Attribute Field Structure (ATTF)

NB: Subfield values are encoded as ASCII or binary as indicated.

tag	subfield name	use	value	comment
ATTL	Attribute label/code	M		binary code for an attribute
ATVL	Attribute value			ASCII value. Missing attribute value = attribute value is deleted or unknown (see S-57 Appendix B.1 clause 3.5.1)

A.1.2.8.3.4 Feature Record National Attribute Field Structure (NATF)

NB: Subfield values are encoded as ASCII or binary as indicated.

tag	subfield name	use	value	comment
ATTL	Attribute label/code	M		binary code for an attribute
ATVL	Attribute value			ASCII value. Missing attribute value = attribute value is deleted.

A.1.2.8.3.5 Feature Record to Feature Object Pointer Control Field Structure (FFPC)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
FFUI	Feature object pointer update instruction	M	{1} or {2} or {3}	= insert = delete = modify
FFIX	Feature object pointer index	M		
NOPT	Number of feature object pointers	M		

A.1.2.8.3.6 Feature Record to Feature Object Pointer Field Structure (FFPT)

NB: Subfield values are encoded as ASCII or binary as indicated.

tag	subfield name	use	value	comment
LNAM	Long name	M		binary
RIND	Relationship indicator	M	{2} or {3}	= slave, binary = peer, binary
COMT	Comment			ASCII

A.1.2.8.3.7 Feature Record to Spatial Record Pointer Control Field Structure (FSPC)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
FSUI	Feature to spatial record pointer update instruction	M	{1} or {2} or {3}	= insert = delete = modify
FSIX	Feature to spatial record pointer index	M		
NSPT	Number of feature to spatial record pointers	M		

A.1.2.8.3.8 Feature Record to Spatial Pointer Field Structure (FSPT)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
NAME	name	M		
ORNT	orientation	M	{1} or {2} or {255}	= forward = reverse = null
USAG	usage indicator	M	{1} or {2} or {3} or {255}	= exterior = interior = exterior boundary, truncated by the data limit = null
MASK	Masking indicator	M	{1} or {2} or {255}	= mask = show = null

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A.2 AML S-57 DATA DICTIONARY

A.2.1 GENERAL GUIDELINES

A.2.1.1 Feature Object Identifiers

Each feature object must have a unique world-wide identifier. This identifier, called the feature object identifier, is formed by the binary concatenation of the contents of the subfields of the ”Feature Object Identifier” [FOID] field.

The feature object identifier may be used to identify multiple instances of the same object. For example, the same object may appear in different scale bands, or an object may be split by the cell structure. In these circumstances, each instance of this object may have the same identifier.

Feature object identifiers must not be reused, even when a feature has been deleted

A.2.1.2 Cartographic Objects

The use of cartographic objects is prohibited.

A.2.1.3 Time Varying Objects

Specific AML products may contain information about magnetic variation, tides, tidal streams and currents. However, depth information should only be displayed as it has been provided in the AML product and not adjusted by tidal height.

A.2.1.4 Prohibited Attributes

Attributes not included in this Product Specification are prohibited.

A.2.1.5 Numeric Attribute Values

Floating point or integer attribute values must not be padded by non-significant zeros (e.g. 2.5 and not 02.500) unless they are required to specify units of resolution where trailing zeros will become significant in order to distinguish between values (e.g. 3.2 may need to be differentiated from 3.200).

A.2.1.6 Text Attribute Values

The lexical level used for the “Feature Record Attribute” [ATTF] field must be 1 (ISO 8859-1) (see sections A.1.2.7.3.3 and A.1.2.8.3.3). Lexical level 1 or 2 may be used for the “Feature Record National Attribute” [NATF] field (see sections A.1.2.7.3.4 and A.1.2.8.3.4). Format effecting (C0) characters, as defined in S-57 Part 3, Annex B, are prohibited. The delete character is only used in the update mechanism (see S-57 part 3, clause 8.4.2.2.a and 8.4.3.2.a).

A.2.2 UNKNOWN ATTRIBUTE VALUES

In a base data set (Maritime Foundation and Facilities application profile), when an attribute code is present but the attribute value is missing, it means that the producer wishes to indicate that this attribute value is unknown.

In a revision data set (MR application profile), when an attribute code is present but the attribute value is missing it means:

- that the value of this attribute is to be replaced by an unknown value if it was present in the original data set
- that an unknown value is to be inserted if the attribute was not present in the original data set

In both cases the missing attribute value is encoded by the means described in S-57 Part 3, clause 2.1.

A.2.3 USE OF META INFORMATION

A.2.3.1 AML Data Set Metadata

For all AML Products, the Data Set Descriptive records (defined in the application profile structures - sections A.1.2.7.1 and A.1.2.8.1) are used to contain the metadata of the dataset. The mandatory meta information specified in section 5.3.1 is encoded in S-57 as indicated in the table below.

General/Production Information	Field	Sub-field
Production Agency	DSID	AGEN
Dataset Name	DSID	DSNM
Edition Number	DSID	EDTN
Date of Release	DSID	ISDT
Product Specification Description	DSID DSID	PRSP PSDN
Product Specification Edition Number	DSID	PRED
Product Application	DSID	INTU
Compilation Scale	DSPM	CSCL

Security Classification Information	Field	Sub-field
IDO status	DSID	COMT (stored as comma-separated values in free- text subfield)
Protective Marking	DSID	
Owner Authority	DSID	
Caveat	DSID	

Update Information	Field	Sub-field
Update Application Date	DSID	UADT
Update Number	DSID	UPDN

Datums & Units	Field	Sub-field
Horizontal Geodetic Datum	DSPM	HDAT
Vertical Datum	DSPM	VDAT
Sounding Datum	DSPM	SDAT
Co-ordinate Units	DSPM	COUN
Height/Length Units	DSPM	HUNI
Depth Units	DSPM	DUNI
Positional Accuracy Units	DSPM	PUNI

A.2.3.2 Hierarchy of Meta Data

Any meta data stored as attributes of Meta Objects, or, Geo or Spatial features will override meta information stored in the Data Set Descriptive records. The table below indicates which AML meta objects and associated attributes supersede information stored in the data set subfields (see sections A.2.3.1, A.1.2.7.1, and A.1.2.8.1).

NOTES:

In the following tables, acronyms shown in upper-case type, are those approved by the IHO for use in the S-57 data schema. However, additional acronyms have been created for use in the AML data schema. These are shown in lower-case type.

Additionally, the terms 'specific' and 'generic' are used in the tables to indicate an attribute's association to an object class. Attributes that are 'generic' apply to all object classes listed in this Product Specification. Attributes listed as 'specific' relate only to those in the Real-World Features table in section 5.5.2, when included in the 'Associated Attributes' column.

Field	Sub-field	S-57 Meta Object	S-57 Attribute	S-57 Geo Object	S-57 Attribute
DSID	AGEN	M_PROD	AGENCY	generic	AGENCY
DSPM	CSCL	M_CSCL	CSCALE	generic	CSCALE
DSID	COMT (stored as comma-separated values in free-text subfield)	m_clas	secido	generic	secido
			secpmk	generic	secpmk
			secown	generic	secown
			seccvt	generic	seccvt

Field	Sub-field	S-57 Meta Object	S-57 Attribute	S-57 Geo Object	S-57 Attribute
DSPM	VDAT	M_VDAT	VERDAT	specific	VERDAT
DSPM	SDAT	M_SDAT	soudat	specific	soudat
DSPM	DUNI	M_UNIT	DUNITS	specific	DUNITS
N/A	N/A	m_line	linech	generic	linech

A.2.4 SCHEMA

A.2.4.1 AML Maritime Foundation and Facilities Meta Information Table

The meta information specified in section 5.5.1 is encoded in S-57 as indicated in the table below.

Production Information	S-57 Meta Object	S-57 Attribute	S-57 Geo Object	S-57 Attribute
Capture Date	M_PROD	RECDAT	generic	RECDAT
Production Agency	M_PROD	AGENCY	generic	AGENCY
Producing Country	M_PROD	PRCTRY	generic	PRCTRY
Data Coverage	M_COVR	CATCOV	N/A	N/A

Security Classification Information	S-57 Meta Object	S-57 Attribute	S-57 Geo Object	S-57 Attribute
IDO status	m_clas	secido	generic	secido
Protective Marking	m_clas	secpmk	generic	secpmk
Owner Authority	m_clas	secown	generic	secown
Caveat	m_clas	seccvt	generic	seccvt

Geo-Reference Information	S-57 Meta Object	S-57 Attribute	S-57 Geo Object	S-57 Attribute
Vertical Datum	M_VDAT	VERDAT	specific	VERDAT
Sounding Datum	M_SDAT	soudat	specific	soudat
Vertical Datum Shift Area	m_vers	vershf	N/A	N/A
Defined Straight Lines	m_line	linech	specific	linech (spatial object)
Height Units	M_UNIT	HUNITS	specific	HUNITS
Depth Units	M_UNIT	DUNITS	specific	DUNITS
Length/Width Units	M_UNIT	HUNITS	specific	HUNITS

Source Information	S-57 Meta Object	S-57 Attribute	S-57 Geo Object	S-57 Attribute
Source Date	M_CSCL	SORDAT	generic	SORDAT
Source Country	M_CSCL	SORIND	generic	SORIND
Source Agency	M_CSCL	SORIND	generic	SORIND
Source ID	M_CSCL	SORIND	generic	SORIND
Source Type	M_CSCL	SORIND	generic	SORIND
Source Scale	M_CSCL	CSCALE	generic	CSCALE

Data Quality Information	S-57 Meta Object	S-57 Attribute	S-57 Geo Object	S-57 Attribute
Absolute Horizontal Accuracy	M_ACCY (non-bathymetric data) M_QUAL (bathymetric data)	POSACC POSACC	generic generic	POSACC (spatial object) POSACC (spatial object)
Error Ellipse	M_ACCY (non-bathymetric data)	errell	generic	errell (spatial object)
Absolute Vertical Accuracy	M_ACCY	elvacc	generic	elvacc
Relative Horizontal Accuracy	M_ACCY	HORACC	generic	HORACC
Relative Vertical Accuracy	M_ACCY	VERACC	generic	VERACC
Sounding Accuracy	M_QUAL	SOUACC	specific	SOUACC
Quality of Position	M_SREL	QUAPOS	generic	QUAPOS (spatial object)
Quality of Sounding Measurement	M_SREL	QUASOU	specific	QUASOU
Technique of Sounding Measurement	M_SREL	TECSOU	specific	TECSOU
Conformance to the Product Specification	m_conf	catcnf	N/A	N/A

External Reference Information	S-57 Meta Object	S-57 Attribute	S-57 Geo Object	S-57 Attribute
Image File Link	M_NPUB	PICREP	generic	PICREP
Text File Reference	generic	TXTDSC	generic	TXTDSC
Text File Reference (in national language)	generic	NTXTDS	generic	NTXTDS
Reference to a publication	M_NPUB	PUBREF	generic	PUBREF

Other Supporting Information	S-57 Meta Object	S-57 Attribute	S-57 Geo Object	S-57 Attribute
Supporting Textual Information	generic	INFORM	generic	INFORM
Supporting Textual Information (in national language)	generic	NINFOM	generic	NINFOM

Notes:

1. When there is no meta object attribute, an individual attribute can supersede a data set subfield.
2. It is prohibited to use an attribute on an individual object, if this attribute has the same value as the general value defined by the meta object or the equivalent data set subfield.
3. It is prohibited to use a meta object, if the information given by this meta object is the same as the value given by the equivalent data set subfield.

A.2.4.2 AML Maritime Foundation and Facilities Object Table

The table below defines the S-57/AML six-letter acronym for each of the features described in section 5.5.2.

The tables provide the following details:

- feature class name
- the six-character alpha-numeric code for the object class

Geo Object	Acronym
Administration area	ADMIRE
Beacon, cardinal	BCNCAR
Beacon, isolated danger	BCNISD
Beacon, lateral	BCNLAT
Beacon, safe water	BCNSAW
Beacon, special purpose	BCNSPP
Buoy, cardinal	BOYCAR
Buoy, installation	BOYIND
Buoy, isolated danger	BOYISD
Buoy, lateral	BOYLAT
Buoy, safe water	BOYSAW

Geo Object	Acronym
Buoy, special purpose	BOYSPP
Built-up area	BUAARE
Cable area	CBLARE
Cable, submarine	CBLSUB
Coastguard station	CGUSTA
Coastline	COALNE
Deep water route centreline	DWRTCL
Deep water route composite	C_AGGR
Deep water route – part	DWRTPT
Ferry route	FERYRT
Fishing facility	FSHFAC
Fishing ground	FSHGRD
Harbour area (administrative)	HRBARE
Harbour facility	HRBFAC
Ice area	ICEARE
Inshore Traffic Zone	ISTZNE
Land area	LNDARE
Light	LIGHTS
Light float	LITFLT
Light vessel	LITVES
Local magnetic anomaly	LOCMAG
Magnetic variation	MAGVAR
Marine farm / culture	MARCUL
Maritime Safety Information area	msiare
Obstruction	OBSTRN
Offshore platform	OFSPLF
Offshore production area	OSPARE
Pipeline area	PIPARE
Pipeline, submarine/on land	PIPSOL
Production / storage area	PRDARE
Radio broadcast area	rdoare
Radio station	RDOSTA
Rescue station	RSCSTA
Sea area	SEAARE
Seismic activity area	seiare
Signal station, warning	SISTAW
Tidal stream - flood / ebb	TS_FEB
Tidal stream - harmonic prediction	TS_PRH
Tidal stream – non-harmonic prediction	TS_PNH

Geo Object	Acronym
Tidal stream - time series	TS_TIS
Tidal stream panel data	TS_PAD
Tide – harmonic prediction	T_HMON
Tide – non-harmonic prediction	T_NHMN
Tide - time series	T_TIMS
Traffic density	traden
Traffic route	tfcrte
Traffic separation line	TSELNE
Traffic separation scheme boundary	TSSBND
Traffic separation scheme composite	C_AGGR
Traffic separation scheme crossing	TSSCRS
Traffic separation scheme lane part	TSSLPT
Traffic separation scheme roundabout	TSSRON
Traffic separation zone	TSEZNE
Type of shipping	typshp
Weed / kelp	WEDKLP

Collection & Meta Object	Acronym
Conformance to the product specification	m_conf
Data coverage	M_COVR
Data source area	M_CSCL
Vertical datum shift area	m_vers

A.2.4.3 AML Maritime Foundation and Facilities Attribute Table

The table below defines the S-57/AML six-letter acronym for each of the attributes described in section 5.5.3.

The tables provide the following details:

- the attribute name
- the six-character alpha-numeric code

Allowable attribute values for all the attributes listed are given in section 5.5, Schema.

Attribute	Acronym
Absolute horizontal accuracy	POSACC
Absolute vertical accuracy	elvacc
Bearing	bearng
Buried depth	BURDEP
Call sign	CALSGN
Capture date	RECDAT

Attribute	Acronym
Category of administration area	catadm
Category of cardinal mark	CATCAM
Category of coastguard station	catcgs
Category of conformance	catcnf
Category of coverage	CATCOV
Category of ferry	CATFRY
Category of fishing facility	CATFIF
Category of harbour facility	CATHAF
Category of installation buoy	CATINB
Category of lateral mark	CATLAM
Category of light	CATLIT
Category of marine farm / culture	CATMFA
Category of maritime safety information	catmsi
Category of obstruction	CATOBS
Category of offshore platform	CATOFP
Category of pipeline	CATPIP
Category of production area	CATPRA
Category of radio station	CATROS
Category of recommended track	CATTRK
Category of rescue station	CATRSC
Category of signal station, warning	CATSIW
Category of special purpose mark	CATSPM
Category of tidal stream	CAT_TS
Category of traffic separation scheme	CATTSS
Category of weed / kelp	CATWED
Caveat	seccvt
Classification of ice	CATICE
Communication channel	COMCHA
Condition	CONDTN
Conspicuous, radar	CONRAD
Conspicuous, visually	CONVIS
Contact details	condet
Controlling authority	authty
Current velocity	CURVEL

Attribute	Acronym
Depth of water over feature	depwat
Depth range – deepest value	DRVAL2
Depth range – shoalest value	DRVAL1
Depth units	DUNITS
Elevation	ELEVAT
End date	DATEND
Error ellipse	errell
Estimated range of transmission	ESTRNG
Exposition of sounding	EXPSOU
Height	HEIGHT
Height / length units	HUNITS
Image file link	PICREP
International Defence Organisation (IDO) status	secido
Interpolated line characteristic	linech
Jurisdiction	JRSDTN
Light characteristic	LITCHR
Limits of anchors and chains	limanc
Marks – navigational – system of	MARSYS
Name (in English)	OBJNAM
Name (in national language characters)	NOBJNM
Nationality	NATION
Nature of construction	NATCON
Orientation	ORIENT
Owner authority	secown
Producing country	PRCTRY
Product	PRODCT
Production agency	AGENCY
Protective marking	secpmk
Quality of position	QUAPOS
Quality of sounding measurement	QUASOU
Reference to a publication	PUBREF
Reference year for magnetic variation	RYRMGV
Relative horizontal accuracy	HORACC
Relative vertical accuracy	VERACC
Restriction(s)	RESTRN

Attribute	Acronym
Seasonal end date	PEREND
Seasonal start date	PERSTA
Signal frequency	SIGFRQ
Sounding accuracy	SOUACC
Sounding datum	soudat
Source agency	SORIND (comma separated value)
Source country	SORIND (comma separated value)
Source date	SORDAT
Source ID	SORIND (comma separated value)
Source scale	CSCALE
Source type	SORIND (comma separated value)
Start date	DATSTA
Status	STATUS
Strength according to Richter Scale	ricsca
Supporting textual information (in English)	INFORM
Supporting textual information (in national language characters)	NINFOM
Text file reference (in English)	TXTDSC
Text file reference (in national language characters)	NTXTDS
Tidal stream – panel values	TS_TSP
Tidal stream, current – time series values	TS_TSV
Tide – accuracy of water level	T_ACWL
Tide – high and low water levels	T_HWLW
Tide – method of tidal prediction	T_MTOD
Tide – time and height differences	T_THDF
Tide – time series values	T_TSVL
Tide – value of harmonic constituents	T_VAHC
Tide, current – time interval of values	T_TINT
Time end	TIMEND
Time start	TIMSTA
Traffic flow	TRAFIC
Type of built-up area	CATBUA

Attribute	Acronym
Type of cable	CATCBL
Value of annual change in magnetic variation	VALACM
Value of local magnetic anomaly	VALLMA
Value of magnetic variation	VALMAG
Value of nominal range	VALNMR
Vertical datum	VERDAT
Vertical datum shift parameter	vershf
Vertical length	VERLEN
Water level effect	WATLEV

A.2.4.4 Mandatory Attributes

The table below specifies attributes that are mandatory to specific feature classes in Maritime Foundation and Features. Feature classes not included in this table have no mandatory attributes.

Object Class	Attributes				
ADMARE	catadm				
BCNCAR	CATCAM				
BCNLAT	CATLAM				
BCNSPP	CATSPM				
BOYCAR	CATCAM				
BOYLAT	CATLAM				
BOYSPP	CATSPM				
HRBFAC	CATHAF				
ICEARE	CATICE				
LIGHTS	all lights except air obstruction light or fog detector light:- if it is an air obstruction light or fog detector light:-				LITCHR CATLIT
LOCMAG	VALLMA				
M_ACCY	POSACC				
m_clas	secpmk	secown	at least one of:	secido	seccvt
m_conf	catcnf				
M_COVR	CATCOV				
M_CSCL	CSCALE				
m_line	linech				
M_PROD	at least one of:		AGENCY	PRCTRY	
M_QUAL	at least one of:		SOUACC	VERDAT	

Object Class	Attributes				
M_NPUB	at least one of:		PICREP	PUBREF	
M_SDAT	soudat				
M_VDAT	VERDAT				
MAGVAR	RYRMGV	VALACM	VALMAG		
msiare	catmsi				
OBSTRN	CATOBS				
OFSPLF	CATOFP				
OSPARE	CATPRA				
PRDARE	CATPRA				
RDOSTA	CATROS				
RSCSTA	CATRSC				
SEAARE	OBJNAM				
T_TIMS	TIMEND	TIMSTA	T_HWLW		
T_NHMN	T_MTOD	T_THDF			
T_HMON	T_MTOD	T_VAHC			
TS_FEB	CAT_TS	CURVEL	ORIENT		
TS_PAD	TS_TSP				
TS_PNH	T_MTOD	T_THDF			
TS_PRH	T_MTOD	T_VAHC			
TS_TIS	TIMEND	TIMESTA	TS_TSV	T_TINT	
TSSLPT	ORIENT	except when the lane part is a junction			
m_vers	vershf				

A.2.4.5 Mandatory Features

AML Maritime Foundation and Facilities contains the following mandatory features:

- Coastline COALNE

A.2.4.6 Attribute Definitions

AML attribute definitions, permissible values, formats, together with details of S-57 encoding, are given in the AML Object & Attribute Catalogue.

A.2.4.7 Relationships Between Features

Relationships are defined between features in AML Maritime Foundation and Facilities by using the methods specified in sections A.2.4.7.1 and A.2.4.7.2. The application of these relationships is described in section A.3, 'AML Maritime Foundation and Facilities Guidance on Feature Coding and Attribution'.

A.2.4.7.1 Collection Objects

All association or aggregation relationships using collection objects classes 'aggregation' (C_AGGR), or 'association' (C_ASSO) are assumed to be peer to peer. The 'Relationship Indicator' [RIND] subfield of these collection feature records must be {3} = peer.

A.2.4.7.2 Nominated Master feature Record

All hierarchical relationships (master to slave) must be encoded by using a nominated 'master' feature record carrying the pointers to the 'slave' objects in the 'Relationship Indicator' [RIND] subfield in the 'Feature Record to Feature Object Pointer' [FFPT] field with the value {2} = slave.

A.2.4.8 Dependency Between Attributes

Refer to sections A.2.4.3 and A.3, for details of relationships between attributes.

A.3 AML MARITIME FOUNDATION AND FACILITIES GUIDANCE ON FEATURE CODING AND ATTRIBUTION

A.3.1 SCOPE

The following clauses specify the conventions that are to be used to encode the geometry and semantic description of objects in AML Maritime Foundation and Facilities.

This document describes how to encode information that the cartographer considers relevant to a specific purpose. The content of AML Maritime Foundation and Facilities is at the discretion of the producing authority provided that the conventions described below are followed.

A.3.2 GENERAL RULES

Generally, the conventions extant in S-57 APPENDIX B.1, Annex A, Use of the Object Catalogue for ENC will also apply to the AML Maritime Foundation and Facilities product. However, there may be some cases where the range of allowable attribute values may differ, or where additional attributes apply. The following guide-lines seek to clarify such amendments or additions for use in AML Maritime Foundation and Facilities.

This document must be used in conjunction with the AML Maritime Foundation and Facilities product specification.

A.3.2.1 Sounding Datum

The default value for the entire data set is given in the 'Sounding Datum' [SDAT] subfield of the 'Data Set Parameter' [DSPM] field. If the sounding datum is different to the value given in the SDAT subfield for some part of the data set, it may be encoded as meta object M_SDAT.

The areas covered by meta objects M_SDAT must be mutually exclusive.

Meta object : Sounding datum (M_SDAT)
Attributes : soudat INFORM NINFOM

The sounding datum attribute 'soudat' can also apply on an individual object (see note).

NOTE:
When using the attributes **depwat; DRVAL1; DRVAL2** on an individual object the following criteria apply:

1. The 'soudat' attribute must be populated if the sounding datum:

- differs from the sounding datum specified in the SDAT subfield of the Data Set Parameter (DSPM) field structure

or,

- differs from the sounding datum attribute 'soudat' specified by a M_SDAT meta-object

A.3.2.2 Vertical Datum

The default value for the entire data set is given in the 'Vertical Datum' [VDAT] subfield of the 'Data Set Parameter' [DSPM] field. If the vertical datum is different to the value given in the VDAT subfield for some part of the data set, it may be encoded as meta object M_VDAT.

The areas covered by meta objects M_VDAT must be mutually exclusive.

Meta object : Vertical datum (M_VDAT)
Attributes : VERDAT INFORM NINFOM

The vertical datum attribute VERDAT can also apply on an individual object (see note).

NOTE:
When using the attributes **ELEVAT; elvacc; HEIGHT; VERACC; VERLEN** on an individual object the following criteria apply:
1. The VERDAT attribute must be populated if the vertical datum:

- differs from the vertical datum specified in the VDAT subfield of the Data Set Parameter (DSPM) field structure

or,

- differs from the vertical datum attribute VERDAT specified by a M_VDAT meta-object

A.3.2.3 Units

Units are specified in the 'Units of Depth Measurement' [DUNI] subfield and 'Units of Height Measurement' [HUNI] subfield of the 'Data Set Parameter' [DSPM] field. If the units for objects in some part of the data set are different to either of the values given in the DUNI or HUNI subfields, it may be encoded as meta object M_UNIT.

The areas covered by meta objects M_UNIT must be mutually exclusive.

Meta object : Units of measurement of data (M_UNIT)
Attributes : HUNITS INFORM NINFOM
or
DUNITS INFORM NINFOM

The unit attributes 'HUNITS' and 'DUNITS' can also apply on an individual object (see note).

NOTE:
When using the attributes **BURDEP; depwat; DRVAL1; DRVAL2; ELEVAT; elvacc; HEIGHT; limanc; T_HWLW; T_THDF; T_TSVL; VALNMR; VERLEN; vershf** on an individual object the following criteria apply:

1. The measurement units must be set to the appropriate units using the HUNITS or DUNITS attribute if they:

- differ from the units specified in the HUNI subfield of the Data Set Parameter (DSPM) field structure

or,

- differ from the attributes 'HUNITS' or 'DUNITS' specified by a M_UNIT meta-object

A.3.3 MARITIME FOUNDATION AND FACILITIES

A.3.4 MARITIME SAFETY INFORMATION

This category includes the coding of search and rescue areas and the broadcast of various forms of maritime safety information.

A.3.4.1 Radio Stations and broadcast areas

For encoding of radio stations refer to S-57 APPENDIX B.1 ANNEX A – Use of the Object Catalogue Section 12.9.

Note:

The collection object C_ASSO should be used to associate a 'Radio Station' to it's respective 'Radio broadcast area'.

A.3.4.2 Search and Rescue Facilities

A.3.4.2.1 Maritime Rescue Co-ordination Centres

MRCCs are coded as **CGUSTA** with *catcgs* = 1

Maritime Rescue Sub-Centres (MRSC) are coded as **CGUSTA** with *catcgs* = 2

Remarks:

- The **INFORM** (or **TXTDSC**) field will be used to code the contact details for the centres such as telephone number, telex number, digital selective calling number, communications channels and frequencies.
- MRCCs and MRSCs also transmit MSI broadcasts. This information will be encoded using the **RDOSTA** object.

A.3.4.2.2 Search and Rescue regions

Geo object: Maritime Safety Information area (**msiare**)

Attributes: catmsi; NATION; NOBJNM; OBJNAM

Remarks:

- The **msiare** object (when *catmsi*=1) will be a slave to a CGUSTA master object.
- Some international SAR boundaries are internationally agreed, others are provisional. These details should be noted in the INFORM field.

A.3.4.3 Global Maritime Distress and Safety System

GMDSS areas will be encoded using the **msiare** object with *catmsi* = 2.

The attribute OBJNAM will be used to encode whether the area is A1, A2, A3 or A4.

A.3.4.4 Forecast Areas

Meteorological forecast areas will be encoded using the **msiare** object with *catmsi* = 3.

The attribute OBJNAM is used to encode the name of the area and NATION to indicate the nationality of the area as a number of countries will broadcast forecasts for the same area.

A.3.4.5 Satellite Coverage

Areas covered by a satellite will use the **msiare** object with *catmsi* = 4 for INMARSAT or 5 for MilSat.

Contact details of the satellite such as telephone and telex numbers will be encoded in the INFORM field. It should also be noted that the boundaries of coverage are very generalized owing to the exceedingly small scales involved.

A.3.5 REFERENCING OF NAUTICAL PUBLICATIONS

When additional information is required from nautical publications it will be accessed by either:

- a link from specific real world objects using the TXTDSC attribute or
- using the meta object M_NPUB and the TXTDSC or PUBREF attribute to link to soft or hardcopy files respectively. One or more meta objects may cover the entire cell to provide general information such as fishery activity levels in the cell.

A.3.6 PORT LOCATIONS

Ports are encoded using the **ADMARE** object with *catadm* = 1. These may be area or point primitives depending upon the scale of compilation of the cell.

Urban areas close to the sea are encoded with the **BUAARE** object.

A.3.7 AGGREGATION (COMPOSITE) FEATURES

Aggregation features can be used to combine objects that are related in some way, ie a part or component of, to form a single higher level object.

A.3.7.1 Deep Water Route Composite

If both component parts of a Deep Water Route, being the centre line and route part, are used to define a route, they may be aggregated using the "Deep Water Route Composite" feature to form a single deep water route feature. It can then be attributed as shown below:

Collection object:		
	C_AGGR	Deep Water Route Composite
Attribute:	INFORM	Supporting textual information Note: if using a national language equivalent, use the NINFOM attribute.

Attribute:	OBJNAM	Route Name Note: if using a national language equivalent, use the NOBJNM attribute.
Attribute:	TXTDSC	Text file reference Note: if using a national language equivalent, use the NTXTDS attribute.

A.3.7.2 Traffic Separation Scheme Composite

Two or more of the component parts of a traffic separation scheme, being boundary, crossing, lane part, roundabout or zone, may be aggregated using the “Traffic Separation Scheme Composite” feature to form a single traffic separation scheme feature. It can then be attributed as shown below:

Collection object:

	C_AGGR	Traffic Separation Scheme Composite
Attribute:	INFORM	Supporting textual information Note: if using a national language equivalent, use the NINFOM attribute.
Attribute:	OBJNAM	Scheme Name Note: if using a national language equivalent, use the NOBJNM attribute.
Attribute:	TXTDSC	Text file reference Note: if using a national language equivalent, use the NTXTDS attribute.

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