Edition 2.5
2020-04-06

Product Specification for bathymetric Inland ENCs

Introduction

The bathymetric Inland ENC is a S-57 based product in addition to the already existing products (ENC, Inland ENC).

The content of bathymetric ENCs is limited to the bathymetry data only. The depth information can be encoded by means of the object classes depth area (DEPARE, depare), dredged area (DRGARE), depth contour (DEPCNT) and soundings (SOUNDG). Navigable areas without depths information are encoded as unsurveyed areas (UNSARE). Meta data is used to provide information about the pre-mentioned feature objects (e.g. accuracy and quality information).

Due to its limited content a bathymetric Inland ENC does not comply with the existing ENC Product Specification. And it complies with the Product Specification for Inland ECDIS Edition 2.0, 2.1, 2.2, 2.3 neither.

bathymetric Inland ENCs must be regarded as bathymetric complement to ENCs and Inland ENCs. To make use of bathymetric Inland ENCs a dedicated Product Specification for bathymetric Inland ENCs is required. This Product Specification describes the dataset structure, topology, contents, meta information, object classes/attributes etc.

The use of bathymetric Inland ENCs facilitates the incorporation of survey-sensor based depth information during the ENC production process. This is because the bathymetry is stored in separate datasets which are simply replaced when new depth data is available.

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Unless it is specifically stated different in this document the Inland ENC Product Specification is applicable for bathymetric Inland ENCs. In the following the modifications changes and/or extensions are listed.

A bathymetric Inland ENC shall be produced in accordance with the regulations defined in:

- this Product Specification for bathymetric Inland ENC

- the Feature Catalogue for bathymetric Inland ENC

- the Encoding Guide for Inland ENC (especially pages C.1.1, C.1.4, C.1.6, C.1.7, C.1.8, I.1.1, I.1.2, I.1.3, I.1.6, I.1.7, I.1.8, I.1.9 and I.2.1)

The numbering correlates to the ENC Product Specification, S-57 Appendix B.1, Edition 2.0

1.1 Definitions

<adopted with modifications>

1.2 Contents of the document

The bENC Product Specification contains one application profile for the basic bENC used to populate the SENC (EN application profile). An application profile for updating of the SENC (ER application profile) is not defined. The application profile is described in S-57 Part 3, clause 1.4.2.

2.   General information

2.1   Navigational purpose

<changed>

bathymetric Inland ENCs make use of the same navigational purposes as ENCs (1 to 6) and Inland ENCs (1 to 9). However, a bathymetric Inland ENC has a range of categories of navigational purposes (e.g. from usage 4 to 9) it belongs to.

The INTU field of the S-57 Data Set Identification Record is used to indicate the navigational purpose of a cell. The expected input must be a binary value of type "unsigned integer". This is why each possible range of bIENC navigational purpose categories must be mapped to a value of this type.

The mapping is done by means of the following formula:

$$V_{INTU} = NP_{LC} * 10 + NP_{HC} + 128$$

Where V_{INTU} : value of INTU field
NP_{LC} : lower category of navigational purpose
NP_{HC} : higher category of navigational purpose

Example: A usage range from 4 to 9 is mapped to the value 4*10+9+128 = 177.

2.2   Cells

<changed>

In order to facilitate the efficient processing of bathymetric Inland ENC 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 clauses 5.4 and 5.6.3). The geographic extent of the cell must be chosen by the bathymetric Inland ENC 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 coordinates of the borders of the cell are encoded in decimal degrees in the "Catalogue Directory" [CATD] field.
Point or line feature objects which are at the border of two cells with the same navigational purpose 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.

bathymetric Inland ENCs do not have to be rectangular. The meta-object M_COVR with CATCOV1 is used to represent the geographic area containing data.

Data within bathymetric cells of the same navigational purpose must not overlap.

2.3   Topology

<changed>

bathymetric Inland ENCs use planar graph topology without faces (edges must not cross).

3.   Features and attributes

3.1   Feature object identifiers

<adopted>

3.2   Standard features and attributes

<adopted with amendments>
Object classes defined in the Feature Catalogue for Inland ENCs, but not listed in the following section of this document are prohibited for use in bIENCs.

3.3   Objects permitted for use in bENC and their geometric primitives

<changed>
Following is a list of those features allowed in a bathymetric Inland ENC and the geometric primitives allowed for each of them (P = point, L = line, A = area).

#		P	L	A
1	DEPCNT		L	
2	DEPARE			A
3	DRGARE			A
4	UNSARE			A
5	SOUNDG	P		
6	M_COVR			A
7	M_QUAL			A
8	M_SREL			A
9	M_SDAT			A
10	M_CSCL			A
11	M_NPUB			A
12	depare			A
13	m_sdat			A

The attributes and enumerations which may be used for the features are defined in the Feature Catalogue for bathymetric Inland ENCs.

3.4   Meta features

<adopted with modifications>

A meta feature M_COVR is not required to cover any part of the cell that does not contain geographical data.

The meta features M_NSYS and m_nsys are not used.

3.5   Geo and meta feature attributes

3.5.1   Missing enumerations

<adopted>

3.5.2   Mandatory attributes

<changed>

The following table gives the attributes which are mandatory for each feature. When a feature is not in the list it means that there are no mandatory attributes for this feature.

3.5.3

Feature	Attributes					
DEPCNT	VALDCO					
DEPARE	DRVAL1	DRVAL2				
DRGARE	DRVAL1					
M_COVR	CATCOV 1					
M_QUAL	either:	CATZOC	Or at least one of:	POSACC	SOUACC	TECSOU
M_SDAT	VERDAT					
M_CSCL	CSCALE					
depare	DRVAL1	DRVAL2	hunits	wtwdis		
m_sdat	verdat					

Prohibited attributes

<adopted>

3.5.4   Numeric enumerations

<adopted>

3.5.5   Text enumerations

<adopted>

3.5.6   Hierarchy of meta data

<adopted>

3.6   Cartographic features

<adopted>

3.7   Time varying objects

<adopted>

3.8   Geometry

<adopted>

3.9   Relationships

<n/a>

3.10   Groups

3.10.1 Group 1 (skin of the earth)

 <adopted with modifications>

The list below contains the features that must always be in Group 1, if they appear in the dataset and if they are of type area.

DEPARE DRGARE UNSARE depare

3.10.2 Group 2 (all other features)

<adopted>

3.11 Language and alphabet

3.11.1 Language

<adopted>

3.11.2 Use of lexical level 2

<adopted>

4. Cartographic framework

4.1 Horizontal datum

<adopted>

4.2 Vertical and sounding datum

<adopted>

4.3 Projection

<adopted>

4.4 Units

<adopted>

5. Provision of data

5.1 Implementation

<adopted>

5.2 Compression

<adopted>

5.3 Encryption

5.4   Exchange set

If bIENC data is made available via SENC distribution section 5.4 is not applicable.

5.4.1   Content of the exchange set

<adopted with modifications>

Picture files must not be included

5.4.2   Volume naming

<adopted>

5.4.3   Directory structure

<adopted>

5.5   Data sets

<modified>

Two kinds of data sets may be produced :

new data set :   no bathymetric Inland ENC data has previously been produced for this area
                                  and for the same navigational purpose.

new edition of a data set :   new information which has not been previously distributed.

Updates and re-issues must not be produced.

5.6   File naming

5.6.1   README file

<adopted>

5.6.2   Catalogue file
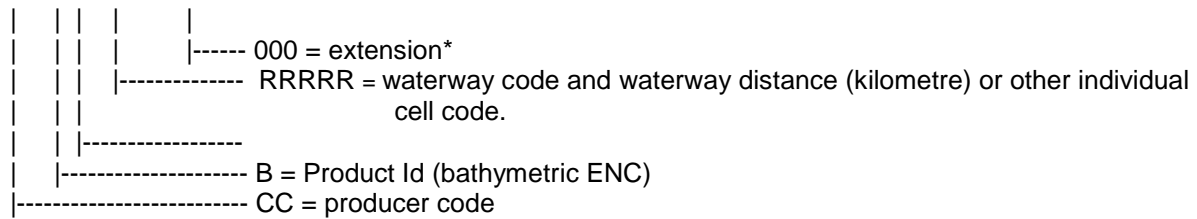
<adopted with modifications>

Not applicable in case of SENC distribution.

5.6.3   Data set files

The data set files are named according to the specifications given below:

```
CCBRRRRR.000
|   |  |  |        |
|   |  |  |        |------ 000 = extension*
|   |  |  |-------------- RRRRR = waterway code and waterway distance (kilometre) or other individual
|   |  |                                cell code.
|   |  |------------------
|   |-------------------- B = Product Id (bathymetric ENC)
|------------------------ CC = producer code
```

The main part forms an eight character identifier where:

- the first two characters identify the producer.
- the third character indicates the Product Id
- the fourth to eighth characters are used for the cell code. This code can be used in any way (e.g. to identify the waterway and the waterway distance) by the producer to provide the unique file name. If characters other than numbers are used only uppercase letters are allowed.

A valid base cell file must be uniquely identified worldwide by its name, and have the extension 000.
*In case of SENC distribution the extension may vary.

5.6.4   Text and picture files

<adopted with modifications>

Picture files are not used.

5.7   Updating

<changed>

In order to ensure that new editions are incorporated into the SENC 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 or new edition must have a 000 extension. In case of SENC distribution the extension may vary.
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.
update number	update number 0 is assigned to a new data set.
update application	update application date
issue date	date on which the data was made available by the data producer.

Each new edition of a data set must have the same name as the base cell file which it replaces. The ENC update mechanism is described in S-57 Part 3, clause 8.

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

5.8   Media

5.9   Error detection

<adopted>

6.   Application profiles

6.1   General

<adopted>

6.2   Catalogue file

<adopted with modifications>

This section is not applicable in case of SENC distribution.

6.3   EN application profile

<adopted with modifications>

Data Set Identification field - DSID

The value of the INTU sub-field must be "unsigned binary". It is determined by means of the following formula:
$V_{INTU} = NP_{LC} * 10 + NP_{HC} + 128$

Where V_{INTU} : value of INTU field
            NP_{LC} : lower category of navigational purpose
            NP_{HC} : higher category of navigational purpose

Example: A usage range from 4 to 9 is mapped to the value 4*10+9+128 = 177

In the PRSP (Product specification) subfield the value {200} is used as the indicator for a bathymetric ENC. The Product specification edition number is 1.0 (PRED sub-field).

Data Set Parameter field – DSPM

In the VDAT (vertical datum) sub-field the value {255} (= null) is used.
In the SOMF (sounding multiplication factor) sub-field the value {100} is used.

6.4   ER application profile

<n/a>