INTERNATIONAL HYDROGRAPHIC ORGANIZATION

RECOMMENDED ENC VALIDATION CHECKS

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1. INTRODUCTION

This document was previously Appendix B1, Annex C of S-57 Edition 3.1. It specifies the checks that, at a minimum, producers of ENC validation tools should include in their validation software. This software will be used by hydrographic offices to help ensure that their ENC data are compliant with the S-57, Appendix B1 ENC Product Specification. The checklist has been compiled for the IHO from lists of checks provided by a number of hydrographic offices and software companies. The document will be maintained by means of new editions.

ENC validation software checks that the data are in conformance with the S-57 ENC Product Specification. Any violations are categorised as either ”errors” or ”warnings”. ”**Errors**” are defined as more serious discrepancies or violations. For example, the data may not conform to one of the mandatory requirements of the ENC Product Specification. ”**Warnings**” identify less serious violations or suspicious data. An example would be the apparent location of a building in the sea. The various checks in this document have been categorised with these definitions in mind.

In order to assist software developers, those checks that have been removed from all previous editions of S58 have been retained in Edition 4.2 as struck out text strings.

Note: Within this document the word "overlap" is used. In the context of this document, this means:

- for two objects of type Area, that their geometric primitives have a certain area in common (there is no overlap when they touch at a point or along an edge),
- for an object of type Line and an object of type Area, that the line object has a part of one of its edges lying within the geometric primitive of the area object (there is no overlap when they touch at a point or along an edge).

LIST OF ENC VALIDATION CHECKS

2.1 Checks relating to S-57 Data Structure

No	Check	Conformity to:	Cat
	DATA STRUCTURE		
	ACCEPT		
	ACCEPT/HO SHOULD CORRECT/HO MUST CORRECT		
	HO SHOULD CORRECT		
	HO MUST CORRECT/HO SHOULD CORRECT		
	HO MUST CORRECT		
1	Check that no part of an edge is duplicated (i.e. a pair of coordinates identical for two edges).	Part 2 (2.2.1.2)	W
2	Check that all VE edges have a beginning node and an end node.	Part 2 (2.2.1.2)	E
3	Check that the record identifier NAME is unique within the file.	Part 3 (2.2)	E
4	Check that Record Name RCNM contains only the values in table 2.2.	Part 3 (2.2.1)	E
5	Check that the Record Identification Number RCID is in the range 1 to 2^{32}-2.	Part 3 (2.2.2)	E
~~6~~	~~Check the CRC of every file~~	~~Part 3 (3.4)~~	~~E~~
7	Check that all objects have legal AGEN, FIDN and FIDS subfield values.	Part 3 (4.3.1) and (4.3.2)	E
8	Check that an attribute code does not repeat for a single object.	Part 3 (4.4), (4.5) and (5.1.2)	E
9	For line objects, check that ORNT = 1 [forward] or 2 [reverse], USAG = 255 [null], and MASK = 1 [mask], 2 [show] or 255 [masking is not relevant].	Part 3 (4.7.2) and Appendix B.1 (3.8)	E
10	For point objects, check that ORNT = 255 [direction is not relevant], USAG = 255 [null], and MASK = 255 [masking is not relevant].	Part 3 (4.7.1)	E
11	Check that all segments with USAG = 3 [exterior boundary truncated by the data limit] are linked to an object M_COVR.	Part 3 (4.7.3.3)	E
12	Check that all feature objects except C_(collection) have a FSPT.	Part 3 (4.7)	E
13	Check that for linear features comprising multiple edges, the vector records making up the linear feature are referenced sequentially and that the end node of a vector record is the same as the start node of the following vector record.	Part 3 (4.7.2)	W
14	Check for any area object having outer and inner boundaries that two of these boundaries do not share more than one node.	Part 3 (4.7.3)	E
15	Check that the first and last edges bounding an area meet at a common connected node.	Part 3 (4.7.3.1)	E
16	Check that area outer boundaries are encoded clockwise.	Part 3 (4.7.3.2)	E
17	Check that area inner boundaries are encoded counter clockwise.	Part 3 (4.7.3.2)	E
18	Check that all areas are defined by: • Only one outer boundary (referenced first), • Optional zero or more inner boundaries which are closed, sequential and with proper use of USAG.	Part 3 (4.7.3.2) and (4.7.3.3)	E
19	Check that all spatial edges which coincide with data limit borders (i.e. limits of M_COVR with CATCOV = 1 [coverage available]) are using USAG = 3 [Exterior boundary truncated by the data limit].	Part 3 (4.7.3.3)	W
20	Check that geometry primitive is compatible with object class.	Appendix B.1 (3.3), Part 3 (5.1.1) and Supplement No2 Ch.4 (3.3.1)	E
21	Check that all vector record pointer (VRPT) fields are pointed to by an	Part 3 (5.1.3)	E

	edge vector record.		
22	Check for correct sequence of begin/end nodes for edges.	Part 3 (5.1.3.2)	E
23	Check that only SG2D and SG3D coordinates are used in files.	Part 3 (5.1.4)	E
24	Check that soundings are coordinate type SG3D with X, Y and Z values.	Part 3 (5.1.4.1)	E

25	• Check that the beginning and end of an edge are explicitly encoded as connected nodes. • Check that the geometry of the connected node is not part of an edge. • Check that edges directly reference their begin/end nodes using the vector record pointer.	Part 3 (5.1.4.4)	E
26	Check that values in subfields are within the allowable range where applicable: • Subfield value ranges according to S-57 format description. • Legal ranges for attribute values (for attribute values of type "float", the resolution given in the format statement by the integer part (e.g. **XX**.X) must not be checked). *(see check 91)*	Part 3 (7.2.2.1), (7.3) and Appendix A, Chapter 2.	E
27	Check all formatted subfields in S-57.	Part 3 (7.2.2.2)	E
28	Check that the count of records in DSSI is correct.	Part 3 (7.3.1.2)	E
29	Check for valid index position for updating in FFPC-NFPT, FSPC-NSPT, SGCC-CCNC, and VRPC-NVPT.	Part 3 (7.6.5), (7.6.7), (7.7.1.5) and (7.7.1.3)	E
30	Check for valid index position for updating in FFPC-FFIX, FSPC-FSIX, SGCC-CCIX, and VRPC-VPIX.	Part 3 (7.7.1.5), (7.6.5), (7.6.7) and (7.7.1.3)	E
31	For all edges, check that all SG2D coordinates are different from the start and end node coordinates.	Part 3 (7.7.1.6)	E
32	Check that record updates refer to a valid record NAME.	Part 3 (8.3.2)	E
33	Check that any attribute update refers to a valid record NAME and attribute label.	Part 3 (8.3.3)	E
34	Check that pointer index updating refers to a valid record NAME and index within pointer fields FFPT, FSPT and VRPT.	Part 3 (8.3.4)	E
35	Check if record version RVER is out of sequence for objects.	Part 3 (8.4.2.1) and (8.4.3.1)	E
36	For record updates for feature/vector updates, check that if it is • DELETE: the record does not contain further fields, or • MODIFY/INSERT: the record contains more information about the update.	Part 3 (8.4.2.2) and (8.4.3.1)	E
37	Check that update and base data have the same lexical level.	Part 3 (8.4.2.2a)	E
38	Check that an update record only contains one FFPC field [8.4.2.3], and one VRPC field [8.4.3.2b], and one FSPC field [8.4.2.4], and one SGCC field [8.4.3.3].	See references in the column to the left.	E
39	Check for connectivity of line segments in an edge after updating.	Part 3 (8.4.3.3)	E
40	Check that any two feature objects of type Line satisfying all of the following conditions are chained together: • both objects are encoded with the same class and attribute values, • both objects refer to linear features for which all referenced edges are encoded with the same spatial attribute values, • linear features of both objects have one (or two) common connected node(s) which is (are) a beginning node or an end node of each linear feature, • each common connected node is not shared by more than two	Logical consistency	W

	objects satisfying the three above conditions.		
41	Check that all areas are closed.	Logical consistency	E
42	Check that VE edges linked to Group 1 objects appear twice with different ORNT values, or are linked to objects M_COVR with CATCOV = 1 [coverage available].	Logical consistency	E

43	Check that all DEPCNT objects coincide with a boundary of two Group 1 objects, except for cases where they appear within an UNSARE or DRGARE.	Logical consistency	W
44	Check that all values (except the shallowest and deepest) DRVAL1 and DRVAL2 of DEPARE of type area are also values of VALDCO.	Logical consistency	W
45	Check that no edge is shared by two or more line objects of the same object class, except for objects from the following list which may share geometry if they are populated with different attribute values: BERTHS, CBLOHD, CBLSUB, CONVYR, DWRTCL, FERYRT, MARCUL, MORFAC, NAVLNE, PIPSOL, RCRTCL, RECTRC.	Logical consistency	W
46	Check for any object having both attributes DATEND and DATSTA encoded with explicit values that DATEND is the same or later than DATSTA.	Logical consistency	E
47	Check for any LIGHTS and RTPBCN object having SECTR1 encoded that SECTR2 is also encoded (with a different value) and vice versa.	Logical consistency	E
48	Check for any M_SREL object having SCVAL1 and SCVAL2 encoded that the value of SCVAL1 has been set to a larger scale than SCVAL2 (i.e. attribute value for SCVAL1 is smaller than attribute value for SCVAL2).	Logical consistency	E
49	Check for any object having DRVAL1 and DRVAL2 encoded that DRVAL1 is smaller than or equal to DRVAL2.	Logical consistency	E
50	Check that all the nodes that compose the geometry of any RECTRC with CATTRK=1 [based on a system of fixed marks], or NAVLNE are on a straight line.	Logical consistency	W
51	Check that no edge is shared by a COALNE object and a SLCONS object of type line, or by a COALNE object and a SLCONS object of type area covered by a LNDARE, and having WATLEV undefined or encoded with the values (2) [always dry] or (1) [partly submerged at high water].	Logical consistency	W
52	Check that any LNDELV object of type Point or Line is situated within a LNDARE object of type Area, or on a LNDARE object of type Line, or shares the geometry of a LNDARE object of type Point, except where the LNDELV object is encoded on an area WRECKS object which is always dry (WATLEV = 2 [always dry]) or is partially submerged at high water (WATLEV = 1 [partly submerged at high water]).	Appendix B1, Annex A (4.7.2, 4.7.4, 6.1.1 and 6.2.1)	E
53	Check that any SLOGRD object is covered by a LNDARE object of type Area. Check that any SLOTOP object is covered by a LNDARE object of type Area or is on its border.	Appendix B1, Annex A (4.7.4, 4.7.5, 4.8.4)	E
54	Check for any CRANES, BUISGL, FORSTC, LNDMRK or SILTNK object, and for any DAYMAR object which is not a slave in a master/slave relationship: • if it is of type Area, that it is covered by a LNDARE, BRIDGE, FLODOC, OFSPLF or PONTON object of type Area, • if it is of type Point, that: - it is situated within a LNDARE, BRIDGE, FLODOC, OFSPLF or PONTON object of type Area, or - it is coincident with one LNDARE, PILPNT, PYLONS, OFSPLF, SLCONS or UWTROC object of type Point, or	Logical consistency	W

	- it is situated on a COALNE, DAMCON, BRIDGE, FLODOC, LNDARE, PONTON or SLCONS object of type Line.		
55	Check that no line or point LNDARE object is situated within a LNDARE object of type Area, except for cases where it is covered by a LAKARE, RIVERS, DOCARE, LOKBSN or CANALS object.	Logical consistency	W
56	Check that any BUAARE object is covered by a LNDARE object of type Area, or is coincident with a LNDARE of type point	Logical consistency	W

57	Check for any COALNE object which does not share spatial geometry with a LNDARE or SLCONS object with CONDTN = 1 [under construction] or 3 [under reclamation] or 5 [planned construction], that it is not situated within a LNDARE object of type Area, or that it does not have a LNDARE object of type Area on both sides.	Logical consistency	W
58	Check that no SBDARE object of type Line bounds a SBDARE object of type Area .	Logical consistency	W
59	Check that no OBSTRN object of type Line bounds an OBSTRN object of type Area.	Logical consistency	W
60	Check that no CBLSUB object is situated within a LNDARE object of type Area.	Logical consistency	W
61	Check for any object with WATLEV = 3 [always under water/submerged]: • if it is of type Line or Area, that: - it is not within or overlaps an intertidal area (DEPARE with DRVAL2 ≤ 0), or - it is not within or overlaps a LNDARE object of type Area, • if it is of type Point, that: - it is not within an intertidal area, or - it is not within a LNDARE object of type Area, or - it is not coincident with a LNDARE object of type point, or - it is not situated on a LNDARE object of type line.	Logical consistency	W
62	Check for all PONTON, HULKES or FLODOC objects of type Area that no edge of their limits shares the geometry of a line COALNE or SLCONS object, except when this edge also shares the geometry of a LNDARE object of type Area.	Logical consistency	W
63	Check that no RECTRC object overlaps or intersects a linear or area object LNDARE, PONTON, HULKES, FLODOC or any other object having WATLEV = 1 [partly submerged at high water] or 2 [always dry].	Logical consistency	E
64	Check that no point or area ACHARE object (except with the value CATACH = 8 [small craft mooring area]) is situated within or overlaps another object with attribute RESTRN containing value 1 [anchoring prohibited].	Logical consistency	W
65	Check that LIGHTS objects in the same spatial position whose sectors overlap each other have at least one of the values encoded differently for these attributes: CATLIT, EXCLIT, LITCHR, SIGPER or SIGGRP. Remark: This check must not be applied to LIGHTS objects with STATUS containing at least one of values 4 [not in use], 6 [reserved], 11 [extinguished].	Logical consistency	W
~~66~~	~~Check for any SOUNDG having the value (1) or nothing for EXPSOU that any depth value is situated within a DEPARE or a DRGARE of the corresponding range.~~ *See new checks 1768 and 1769 ~~and 1770~~*	~~Logical consistency~~	~~W~~
67	Check that no object is duplicated (same class, same attribute description and same geometry).	Data structure	W
68	Check if there is an update to an object without the corresponding text/graphic file.		W
~~69~~	~~Check that the Agency Code of feature objects is valid.~~	~~Appendix A,~~	~~W~~

Comment [f1]: Must Correct if referenced ancillary file is absent (Test needs rewording as current wording suggests that all updates should have a referenced ancillary file)

		~~Annex A~~	
70	Check that all line DEPARE objects coincide with a Group 1 boundary.	Logical consistency	E

Comment [f2]: Remove test

71	Check that no object of type Area (except for objects where all of the edges have USAG = 3) has all of its edges masked (i.e. USAG = 3 [exterior boundary truncated by the data limit] or MASK = 1 [mask]). Check that no object of type Line has any of it's edges masked (i.e. MASK = 1 [mask]).	Logical consistency	W
72	Check that no loop exists in the graph of hierarchical relationships (e.g. no master object is slave of its own slave, ...).	Logical consistency	W
73	Check that no attribute value contains a leading or a trailing space, and that no attribute of type List contains any space.	Logical consistency	W
74	Check for any floating DEPCNT object (i.e. does not share any edge with a Group 1 object) which is within an area DEPARE object, that DRVAL2 >VALDCO >DRVAL1. Remark: This check must only be applied if both DRVAL1 and DRVAL2 for the DEPARE object are encoded with explicit and different attribute values.	Logical consistency	E
75	Check for any floating DEPCNT object (i.e. does not share any edge with a Group 1 object) which is within an area DRGARE object, that VALDCO > DRVAL1. Remark: This check must only be applied if DRVAL1 for the DRGARE object is encoded with an explicit value.	Logical consistency	W
76	Check that no DEPCNT object is within a FLODOC, HULKES, LNDARE or PONTON object of type Area.	Logical consistency	E
77	Check that no DEPCNT object crosses another DEPCNT object.	Logical consistency	E
78	Check for any area object that no boundary crosses itself.	Topology	E
79	Check for any line object that no component edges of a line object cross without a connected node at the crossing point.	Topology	W
80	Check that no area object has incorrect boundary nesting. i.e. at least one of the following cases detected: • An internal boundary is completely within an internal boundary; • An internal boundary is completely outside an external boundary; • An external boundary is completely within an internal boundary.	Topology	E
81	Check that no spot sounding coincides with another spot sounding (of the same or different depth).	Topology	E
82	Check that no linear or area object is using the same edge more than once.	Topology	E
83	Check that no node coincides with another node (connected or isolated).	Topology	W
84	Check that no physically isolated node is marked as connected (and vice versa).	Part 3 (2.2.1)	E
85	Check that all AGEN subfield values (in DSID and FOID fields) in an update (ER) file are identical to the AGEN subfield values in the DSID base (EN) file.	Part 3 (4.3.1) and (7.3.1.1)	E
86	Check that any feature record of type Point (including sounding feature record) only references one vector record.	Part 3 (4.7.1)	W
87	Check for edges with degenerated geometry (when consecutive vertices coincide).	Part 3 (4.7.2)	E
88	For area features, check that ORNT = 1 [forward] or 2 [reverse], USAG = 1 [exterior], 2 [interior] or 3 [exterior boundary truncated by the data limit] and MASK = 1 [mask], 2 [show] or 255 [masking is not relevant].	Part 3 (4.7.3)	E
89	Check that no master object references the same object as slave more than once and that no slave object is referenced by more than one master object.	Part 3 (6.3)	E
90	Check the conformity of the DDR (Data Descriptive Record). (In a catalogue file, it only contains the description of the catalogue file	Part 3 (7) and Part 3 (A.2)	W

	structure. In an EN file, it only contains the description of the base cell file structure. In an ER file, it only contains the description of the update cell file structure).		
91	Check for all attribute values of type "float", that the number of digits in the integer part is smaller than or equal to the number of digits given in the format statement (e.g. **XX**.X).	Part 3 (7.2.2.1), (7.3) and Appendix A, Chapter 2.	W
92	Check for any update (ER) file having RUIN = 3 [modify] in the FRID field, that the FOID field for the modified object is identical in the base (EN) and update (ER) files.	Part 3 (8.4.2)	E
93	Check for any object with WATLEV = 4 [covers and uncovers] or 5 [awash]: • if it is of type Line or Area, that: - it is not within or overlaps a LNDARE object of type Area, • if it is of type Point, that: - it is not within a LNDARE object of type Area, or - it is not coincident with a LNDARE object of type point, or - it is not situated on a LNDARE object of type line.	Logical consistency	W
94	Check that no ER file contains instructions for the FSPC field to modify a FSPT field of a feature object to a value that it already contains.	Logical consistency	E

2.2 Checks relating to ENC Product Specification

	ENC PRODUCT SPECIFICATION		
500	Check that all data are within the cell limits.	2.2	E
501	Check that cells are rectangular.	2.2	E
502	Check that the dataset file contains no more than 5 megabytes of data.	2.2	E
503	Check that all objects in a cell have a unique FOID.	3.1	W
504	Check for all prohibited object classes for ENC.	3.2	E
505	Check for mandatory meta object classes.	3.4	E
506	Check that mandatory subfields in EN and ER files contain a value (which may be a missing attribute value in the ATVL subfield of the ATTF field).	3.5.1 and Part 3 (2.1)	E
507	Check for all mandatory attributes.	3.5.2 and Supplement No2 Ch.4 (3.5.2.1)	E
508	Check that COLPAT is encoded for every object (except LIGHTS) with more than one COLOUR. Check that no object with a value for COLPAT has only one COLOUR.	3.5.2 Logical consistency	E
509	Check for all the following cases that the mandatory attribute has a value: ARCSLN: NATION ASLXIS: NATION CTNARE: INFORM or TXTDSC DEPARE: DRVAL1 and DRVAL2 DRGARE: DRVAL1 NEWOBJ: CLSDEF and CLSNAM SWPARE: DRVAL1 DEPCNT: VALDCO LNDELV: ELEVAT MAGVAR: VALMAG CONZNE: NATION COSARE: NATION CUSZNE: NATION EXEZNE: NATION FSHZNE: NATION STSLNE: NATION TESARE: NATION M_COVR: CATCOV M_CSCL: CSCALE M_QUAL: CATZOC M_SDAT: VERDAT M_VDAT: VERDAT TS_PAD: TS_TSP DWRTPT: ORIENT DWRTCL: ORIENT M_NSYS: MARSYS or ORIENT RCTLPT: ORIENT Remark: For these objects, the above mandatory attributes are meaningless without values.	3.5.2 and Supplement No2 Ch.4 (3.5.2.1)	W
510	Check that HORDAT only appears in M_HOPA.	3.5.3	E
511	Check that the prohibited attributes DUNITS, HUNITS, RECDAT, RECIND, SCAMAX, PUNITS, CATQUA are not used.	3.5.3	E
512	Check for numeric attribute values (i.e. of type float ('F') or integer('I')) padded with non-significant zeroes.	3.5.4	E

Comment [EEM3]: : Change to 3.1, supplement 1

513	Check that an attribute on an individual Geo object does not have the same value as the general value defined by the meta object.	3.5.6	E
~~514~~	~~Check that no use of cartographic objects has been made.~~	~~3.6~~	~~E~~
515	Check that all edges with USAG = 3 [exterior boundary, truncated by the data limit] have MASK = 255 [null].	3.8	E
516	Check that all master/slave relations are valid. • If the master object is of type point, check that the slave object is sharing the same node as the master object. • If the master object is of type line, check that the slave object is situated on the line covered by the master object. • If the master object is of type area, check that the slave object is situated within or on the boundary of the area covered by the master object. NOTE: CRANES, FLODOC, FORSTC, FSHFAC, HULKES, PONTON, OBSTRN, PYLONS, SILTNK and WRECKS objects must be considered as possible structure objects, in addition to the list given in Annex A (12.1.1).	3.9 and Appendix B1, Annex A (12.1.1 & 12.1.2)	W
517	For a collection feature record: • Check that it references at least two other feature objects. • Check that it does not reference itself. • Check that PRIM = 255 [no geometry]. • Check that there is only one master relationship per collection feature – all others must be slaves. • Check that if a relationship is peer, then all other features in the collection are peer.	3.9 and Appendix B1, Annex A (15), and Part 3 (6.2)	E
518	Check that all feature objects belong to the correct group: • Check for all Group 1 objects having a Geometric Primitive of type Area, that the GROUP subfield [GRUP] of the Feature Record Identifier [FRID] is set to (1) [Group 1]. • Check for all others feature objects that the GROUP subfield [GRUP] of the Feature Record Identifier [FRID] is set to (2) [Group 2].	3.10	E
519	Check Group 1 coverage and consistency.	3.10.1	E
520	Check that the use of international character sets complies with ENC Prod Spec: • Check that the general text in the ATTF field is lexical level (0) or (1), with appropriate encoding of DSSI-ATTF. • Check that the general text in the NATF field is lexical levels (0), (1) or (2) with appropriate encoding of DSSI-NATF. • If attributes NINFOM and NPLDST contain data, check that corresponding INFORM and PILDST contain data: or report an error if they do not contain data. • Report an error if lexical level (2) is used anywhere else than in the NATF field. The report should contain a statement if international character sets are used and the invoking sequence, so that a check can be made on the language used. • Check the consistency between the use of international characters and the encoding of DSSI-AALL/NALL. • Check that the UT and FT are encoded at the lexical level specified and used for that field. • Check that all national language attributes are encoded in the Feature Record National Attribute (NATF) field. • Check that all feature object attributes (non national) are encoded in the Feature Record Attribute (ATTF) field.	3.11 and 3.5.5	E

521	Check that OBJNAM and NOBJNM values, or INFORM and NINFOM values, or PILDST and NPLDST values, are different for any particular object.	3.11.1	W
522	Check that if NOBJNM is encoded, then OBJNAM has also been encoded.	3.11.1	W
523	Check that HDAT = 2 [WGS 84].	4.1	E
524	Check that DUNI = 1 [metres].	4.4	E
525	Check that PUNI = 1 [metres].	4.4	E
526	Check that COUN = 1 [latitude/longitude].	4.4	E
527	Check that all files referenced by TXTDSC, NTXTDS and PICREP attributes exist and that the file names are in accordance with the ENC Product Specification.	5.4.1 and 5.6.4	E
528	Check for existence of a catalogue file.	5.4.1	E
529	Check that volume names are in accordance with the ENC Product Specification.	5.4.2	E
530	Check that the directory structure for physical media is in accordance with the ENC Product Specification. • An ENC_ROOT directory must exist in the first volume.	5.4.3	E
531	Check that file names are in accordance with the ENC Product Specification.	5.6.1, 5.6.2 and 5.6.3	E
532	Check that text and graphic file names are unique, with extension (e.g. .TXT and .TIF) for new editions and re-issues.	5.6.4	W
533	Check that the DSID-UADT subfield is not used in an ER file.	5.7	E
534	Check that a delete cell message only contains the DSID field with EDTN = 0.	5.7	E
535	Check that the CRC value computed on the received file is the same as the CRC value transmitted.	5.9.1	E
536	Check that only fields that have a repetition factor repeat.	6.1.3	E
537	Check that the format of the catalogue file is correct.	6.2	E
538	Check that CADT-IMPL = “BIN”.	6.2.2	E
539	Check that DSID-PROF subfield value is either 1 [EN] or 2 [ER].	6.3 and 6.4, Part 3 (7.3.1.1)	E
540	Check that mandatory records, fields and subfields for EN and ER files are included and contain data. Prohibited records, fields and subfields should not be used.	6.3 and 6.4	E
541	Check that the SIGGRP format is correct for all LIGHTS, except for fixed LIGHTS, which must not have a value for SIGGRP.	Appendix A Ch.2 (code 141)	E
542	Check that any attribute value SIGGRP starts and finishes with a bracket.	Appendix A Ch.2 (code 141)	E
543	Check that any TS_TSP attribute value conforms to the correct structure, (i.e. values separated by commas).	Appendix A Ch.2 (code 159)	E
544	Check that any area covered by a M_COVR object with CATCOV = 2 [no coverage available] does not contain any other object.	2.2	E
545	Check that each object has a valid object class code as defined by the Object Catalogue and S-57 Supplement No 2	3.2 and Supplement No2 Ch.2	E
546	Check that each attribute has a valid attribute class code as defined by the Object Catalogue and S-57 Supplement No 2.	3.2 and Supplement No2 Ch.3	E
547	Check that no object contains attributes outside the list of permissible attributes for the object’s class (as defined in the Object Catalogue and S-57 Supplement No 2 for the specified object.	3.2 and Supplement No2 Ch.2	E
548	Check that M_COVR meta objects provide exhaustive non-overlapping coverage of the whole cell.	3.4	E
549	Check that all DEPARE and DRGARE objects are covered by M_QUAL objects without gaps or overlaps.	3.4	E

550	Check that any UNSARE object that contains or is partly covered by a DEPCNT, OBSTRN, SOUNDG, UWTROC or WRECKS object is covered by M_QUAL objects without gaps or overlaps.	3.4	W
551	Check that text attribute values do not use format effecting (C0) characters (C0 as defined in S-57 Part 3, Annex B). Check that the delete character is only used in the update mechanism (i.e. in records with RUIN = 3 [modify]).	3.5.5	E
~~552~~	~~Check for any object that has been encoded with one of the new attribute values introduced in S-57 Edition 3.1 that INFORM contains a description of the enumerate value.~~	~~3.5.7~~	~~E~~
553	Check that no Group 1 object contains the attributes DATSTA, DATEND, PERSTA or PEREND.	3.10.1 and logical consistency	E
554	Check for any edge used by only one M_COVR object with CATCOV = 1 [coverage available], that it is also shared with one, and only one, Group 1 object.	3.10.1	E
555	Check that the order of data in each base or update file is correct.	6.1.1	E
556	Check for the limits of data set files given in the Catalogue Directory field (CATD) of the catalogue file (subfields SLAT, WLON, NLAT, ELON): 1. That the limits for base cell files are identical to the furthest coordinates of M_COVR geometry found in the corresponding base cell files. 2. That the limits for update cell files are identical to the limits of the base cell file to which they apply.	5.6.3, 6.2.2 and logical consistency	E
557	Check that any SIGSEQ attribute value conforms to the correct structure (i.e. string content in accordance with format specification).	Appendix A Ch.2 (code 143)	E
558	Check for any object having SIGSEQ encoded that the value of SIGPER is equal to the sum of intervals of light and intervals of eclipse described by SIGSEQ.	Appendix A Ch.2 (code 143) and logical consistency	E
559	Check that no STATUS attribute value contains an impossible combination: • 1 [permanent] with at least one of 2 [occasional], 5 [periodic/intermittent], 7 [temporary]; • 3 [recommended] with at least one of 4 [not in use],11 [extinguished]; • 4 [not in use] with at least one of 5 [periodic/intermittent], 9 [mandatory]; • 5 [periodic/intermittent] with 11 [extinguished]; • 9 [mandatory] with 11 [extinguished]; • 16 [watched] with 17 [un-watched]; • 8 [private] with 14 [public].	Appendix A Ch.2 (code 149) and logical consistency	W
560	Check that all feature objects in a data set having the same FOID have the same description (same object class and attribute values) and are of type Line or Area.	3.1	E
~~561~~	~~Check that all feature objects in a data set having the same FOID are not part of a collection object or a master/slave relationship.~~	~~3.1~~	~~E~~
562	Check for any NEWOBJ object, that at least one of the attributes INFORM or TXTDSC contains the name of the feature object. The text must commence with the approved object class name (CLSNAM) of the feature (i.e. New Object).	Supplement No2 Ch.4 (3.3.1) and Ch.5 (16)	E

~~563~~	~~Check for any RESARE object that has been encoded with values (27) [Environmentally Sensitive Sea Area (ESSA)] and/or (28) [Particularly Sensitive Sea Area (PSSA)] for CATREA, that at least one of the attributes INFORM or TXTDSC contains the meaning of the value. The text must commence with the meaning of the value (i.e. Environmentally Sensitive Sea Area (ESSA) or Particularly Sensitive Sea Area (PSSA).~~	~~Supplement No1 Ch.4 (3.5.7.1)~~	~~E~~
~~564~~	~~Check for any base (EN) or update (ER) file containing at least one object of the following list: ARCSLN, ASLXIS, NEWOBJ, or RESARE having CATREA = 27 [Environmentally Sensitive Sea Area (ESSA)] or 28 [Particularly Sensitive Sea Area (PSSA)], • that it contains the following subfield values in the DSID field: – (03.1) for the STED subfield, – (2.0) for the PRED subfield, • that it has the text "STED:3.1.1;" included in the COMT subfield of the DSID field.~~	~~Supplement No1 Ch.4 (6.3.2.1 and 6.4.2.1)~~	~~E~~
~~565~~	~~Check for any update (ER) file applying to a base (EN) file which has the text "STED:3.1.1;" included in the COMT subfield of the DSID field, • that it contains the following subfield values in the DSID field: – (03.1) for the STED subfield, – (2.0) for the PRED subfield, • that it has the text "STED:3.1.1;" included in the COMT subfield of the DSID field.~~	~~Supplement No1 Ch.4 (6.4.2.1)~~	~~E~~
566	Check that there is no NEWOBJ object in the data that has not been approved by an IHO ENC Encoding Bulletin.	Supplement No2 Ch.2 (2.8), Ch.4 (3.3.1) and Ch.5 (16)	E

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~~1.2~~2.3 Checks relating to ECDIS

	ECDIS		
1000	Check that the file extension is sequential until a new edition of the base set is issued.	Appendix B.1 (5.7)	E
1001	Check if DSID-UPDN is out of sequence.	Appendix B.1 (5.7)	E
1002	Check for proper usage of file extension, EDTN, UPDN, UADT and ISDT for re-issues of an ENC.	Appendix B.1 (5.7)	E
1003	Check that EDTN starts one higher than the previous edition number.	Appendix B.1 (5.7)	E
1004	Check that the file names of a base set and the re-issue are identical.	Appendix B.1 (5.7)	E
~~1005~~	*see check 1797*		

2.4 Checks relating to Use of the Object Catalogue for ENC

	USE OF THE OBJECT CATALOGUE FOR ENC		
		Appendix B.1-Annex A	
1500	Check that certain area objects do not overlap for logical reasons: • LNDARE and SBDARE. • LNDARE and CBLARE.	Logical consistency	W
~~1501~~	~~Check that no M_HDAT objects exist.~~	~~2.1.1~~	~~E~~
1502	Check that no spatial object contains the attribute HORDAT.	2.1.1	E
1503	Check that no object has an attribute value for VERDAT without a value for at least one of ELEVAT, HEIGHT, VERCCL, VERCLR, VERCOP or VERCSA. Exceptions are M_VDAT and M_SDAT objects (subject to their own QA tests).	2.1.2	W
1504	Check that the value in the Vertical Datum subfield (VDAT) of the Data Set Parameter field (DSPM) is not null.	2.1.2	E
1505	Check that there are no M_VDAT objects which have an attribute value for VERDAT equal to that given in the Vertical Datum subfield (VDAT) of the Data Set Parameter field (DSPM).	2.1.2	E
1506	Check that all Geo objects which have attribute values relative to a Height Datum and which cross a M_VDAT object boundary are split at that boundary.	2.1.2	E
1507	Check that no M_VDAT objects overlap one another.	2.1.2	E
1508	Check that no M_SDAT objects overlap one another.	2.1.3	E
~~1509~~	~~Check that no VERDAT attribute exists for the objects DEPARE DEPCNT, DRGARE, OBSTRN, SOUNDG, UWTROC, or WRECKS.~~	~~2.1.3~~	~~E~~
1510	Check that the value in the Sounding Datum subfield (SDAT) of the Data Set Parameter field (DSPM) is not null.	2.1.3	E
1511	Check that there are no M_SDAT objects, that have an attribute value for VERDAT equal to that given in the Sounding Datum subfield (SDAT) of the Data Set Parameter field (DSPM).	2.1.3	E
1512	Check that all SOUNDG objects and all those objects that have at least one of VALSOU, VALDCO, WATLEV, EXPSOU, DRVAL1 or DRVAL2 encoded with an explicit value and which cross a M_SDAT object boundary are split at that boundary.	2.1.3	E
1513	Check that the value for the Units of Height measurement subfield (HUNI) of the Data Set Parameter field (DSPM) is (1) [metre].	2.1.4	E
~~1514~~	~~Check that no M_UNIT objects exist~~	~~2.1.4~~	~~E~~
1515	Check that if an object contains a value for the attributes DATEND, DATSTA, PEREND, PERSTA, SORDAT, CPDATE, SUREND or SURSTA, that this value conforms to ISO 8601:1988.	2.1.5	E
1516	Check that any Group 2 seasonal/periodic object (if the object class is concerned at once by the attributes STATUS, PERSTA and PEREND) with the attribute STATUS containing the value (5) [periodic/intermittent] also has the start and end of the active period encoded in PERSTA and PEREND, and vice versa.	2.1.5.1	W
1517	Check that if an object contains values for the attributes TIMSTA and TIMEND, that these values conform to the format defined in Chapter 2 of S-57 Appendix A.	2.1.6	E
1518	Check that the value of the Producing agency subfield (AGEN) of the Data Set Identification field (DSID) is correct, and that it is the same as the first two characters of the data set file name.	2.2.1	E
~~1519~~	~~Check that no M_PROD objects exist.~~	~~2.2.1~~	~~E~~

1520	Check that the value of the Edition Number (EDTN) subfield of the Data Set Identification field (DSID) is correct.	2.2.2	E
1521	Check that the value of the Update Number (UPDN) subfield of the Data Set Identification field (DSID) is correct, and that it is equivalent to the extension of the data set file name, except in the case of a re-issue; in which case, it should be equal to the last update number.	2.2.2	E
1522	Check that the value of the Update application date (UADT) subfield of the Data Set Identification field (DSID) is correct for data sets with a file name extension of ".000", or that it is null in all other cases.	2.2.2	E
1523	Check that the value of the Issue date (ISDT) subfield of the Data Set Identification field (DSID) is correct, and that for data sets with a file name extension of ".000" it is greater than or equal to the value of the Update application date (UADT) subfield.	2.2.2	E
1524	Check that no M_QUAL object contains the attribute DRVAL1, unless a swept area occupies the entire M_QUAL object.	2.2.3.1	E
1525	Check that no M_QUAL object that has an attribute value for DRVAL1 contains a value for POSACC.	2.2.3.1	E
1526	Check that any M_QUAL object, which has an attribute value for SOUACC, also has an attribute value for DRVAL1.	2.2.3.1	E
~~1527~~	~~Check that any DRVAL2 attribute value for M_QUAL objects is greater than or equal to the maximum depth to which the CATZOC category for that M_QUAL object indicates.~~	~~2.2.3.1~~	~~E~~
~~1528~~	~~Check that if there is an attribute value for TECSOU for a given M_QUAL object, that only one sounding technique has been used within that M_QUAL object coverage.~~	~~2.2.3.1~~	~~E~~
1529	Check that no object falling within a given M_QUAL object coverage has an attribute value for TECSOU that is equivalent to an attribute value for TECSOU on the M_QUAL object.	2.2.3.1 and 2.2.3.5	E
1530	Check that no object falling within a given M_QUAL object coverage has an attribute value for SOUACC that is equivalent to the SOUACC or CATZOC attributes for the M_QUAL object.	2.2.3.1 and 2.2.3.4	E
1531	Check that no M_QUAL object has attribute values for POSACC, SOUACC, QUASOU or TECSOU which are equivalent to or degrade the accuracy indicated by the attribute value of CATZOC.	2.2.3.1	E
1532	Check that if there is an attribute value for SURSTA for a given M_QUAL object that it relates to the oldest survey of two or more surveys for that M_QUAL object coverage.	2.2.3.1	E
1533	Check that no DRGARE object has a value for SOUACC that is equivalent to or degrades the accuracy indicated by the attribute value of CATZOC on the meta object M_QUAL.	2.2.3.1	E
1534	Check that no UWTROC object has a value for SOUACC that is equivalent to or degrades the accuracy indicated by the attribute value of CATZOC on the meta object M_QUAL.	2.2.3.1	E
1535	Check that no UWTROC object has a value for SOUACC that is equivalent to or degrades the SOUACC attribute on the object M_QUAL.	2.2.3.1	E
1536	Check that no WRECKS object has a value for SOUACC that is equivalent to or degrades the accuracy indicated by the attribute value of CATZOC on the meta object M_QUAL.	2.2.3.1	E
1537	Check that no WRECKS object has a value for SOUACC that is equivalent to or degrades the SOUACC attribute on the object M_QUAL.	2.2.3.1	E
1538	Check that no OBSTRN object has a value for SOUACC that is equivalent to or degrades the accuracy indicated by the attribute value of CATZOC on the meta object M_QUAL.	2.2.3.1	E

1539	Check that no OBSTRN object has a value for SOUACC that is equivalent to or degrades the SOUACC attribute on the object M_QUAL.	2.2.3.1	E
~~1540~~	~~Check that SORIND has not been used for encoding the SURATH.~~	~~2.2.3.2 and 2.2.5.1~~	~~E~~
1541	Check that QUASOU when used on SOUNDG is not identical to the value in M_SREL.	2.2.3.3	E
1542	Check that no object falling within a given M_ACCY object coverage has an attribute value for POSACC that is equivalent to the POSACC attribute for the M_ACCY object.	2.2.4.1	E
~~1543~~	~~Check that no object falling within a given M_ACCY object coverage has an attribute value for QUAPOS that is equivalent to the QUAPOS attribute for the M_ACCY object.~~	~~2.2.4.1~~	~~E~~
1544	Check that no M_ACCY object contains the attributes HORACC, SOUACC and VERACC.	2.2.4.1	E
1545	Check that no object has an attribute value for HORACC without an attribute value for HORCLR.	2.2.4.2	E
1546	Check that no object has an attribute value for VERACC without a corresponding attribute value for at least one of VERCLR, VERCOP, VERCSA or VERCCL.	2.2.4.3	E
~~1547~~	~~Check that any bathymetric or hydrographic object that is of Point geometric type with an attribute value for SORIND has a corresponding attribute value for SORDAT, and that the values are different to those given by SORIND and SORDAT of the overlying M_SREL.~~	~~2.2.5.1~~	~~W~~
1548	Check that any non-bathymetric object, which has an attribute value for SORIND has a corresponding attribute value for SORDAT.	2.2.5.2	W
1549	Check that the value in the Compilation Scale of data subfield (CSCL) of the Data Set Parameter field (DSPM) is not null.	2.2.6	E
1550	Check that no M_CSCL object has a value for the attribute CSCALE equal to that given in the Compilation Scale of data subfield (CSCL) of the Data Set Parameter field (DSPM).	2.2.6	E
1551	Check that no two M_CSCL objects overlap.	2.2.6	E
~~1552~~	~~Check that no object contains the attribute SCAMAX.~~	~~2.2.7~~	~~E~~
1553	Check that any value of SCAMIN is set to a scale value smaller than or equal to the compilation scale of the data for the area.	2.2.6 and 2.2.7	E
1554	Check that no Group 1 objects and no meta objects have been encoded with the attribute SCAMIN.	2.2.7	E
~~1555~~	~~Check that no attribute value for INFORM and NINFOM contains formatting characters (C0 as defined in S-57 Part 3, Annex B).~~ *(see check 551)*	~~2.3~~	~~E~~
1556	Check that any text files forming part of the dataset are ASCII files, except for the national language attribute NTXTDS when NATF lexical level subfield [NALL] of the Data Set Structure Information field [DSSI] is set to (2).	2.3	E
1557	Check that all T_HMON objects have a value of (1) [simplified harmonic method of tidal prediction] or (2) [full harmonic method of tidal prediction] for the attribute T_MTOD.	3.2.2	E
1558	Check that all T_NHMN objects have a value of (3) [time and height difference non-harmonic method] for the attribute T_MTOD.	3.2.3	E
1559	Check that any T_NHMN object is associated (using the collection object C_ASSO with a T_TIMS or T_HMON object).	3.2.3	E
1560	Check that all TS_PRH objects have a value of (1) [simplified harmonic method of tidal prediction] or (2) [full harmonic method of tidal prediction] for the attribute T_MTOD.	3.3.3	E

1561	Check that all TS_PNH objects have a value of (3) [time and height difference non-harmonic method] for the attribute T_MTOD.	3.3.4	E
1562	Check that any TS_PNH object is associated (using the collection object C_ASSO) with a TS_TIS or TS_PRH object.	3.3.4	E
1563	Check that any RIVERS, CANALS, LAKARE, DOCARE or LOKBSN objects are covered by a LNDARE or UNSARE object of type Area.	4.1	E
1564	Check that no CTRPNT object contains the attributes VERDAT and VERACC.	4.3	E
1565	Check for all LNDARE objects of type Area that any edge of the limits shares the geometry of at least one object of the following list: • linear objects: COALNE, SLCONS, GATCON, DAMCON. • area objects: M_COVR, GATCON, DAMCON, RIVERS, TUNNEL, DRYDOC, CANALS, LAKARE, LOKBSN, DOCARE, LNDARE. • area objects with WATLEV = 1 [partly submerged at high water], 2 [always dry] or 6 [subject to inundation or flooding]: CAUSWY, SLCONS, MORFAC, WRECKS, OBSTRN, PYLONS.	4.5	W
1566	Check that no edge of a COALNE or linear SLCONS object bounds an area RIVERS, CANALS, LAKARE, DOCARE, DRYDOC or LOKBSN object, except when this edge is also shared by a boundary of a DEPARE, DRGARE, UNSARE, PONTON, FLODOC or HULKES object for which the direction of the edge is the opposite of the one encoded for the RIVERS, CANALS, LAKARE, DOCARE, DRYDOC or LOKBSN object (i.e. …except when this edge separates the area RIVERS, CANALS, LAKARE, DOCARE, DRYDOC or LOKBSN object from an area navigable at compilation scale).	4.5 4.6.6.1 4.6.6.3	E
1567	Check that no COALNE object contains the attributes VERDAT and VERACC.	4.5.1	E
1568	Check that any SLCONS objects of type Area are covered by a LNDARE, DEPARE or UNSARE object of type Area.	4.5.2	E
1569	Check that any SLCONS objects of type Area with WATLEV = 3 [always under water/submerged], 4 [covers and uncovers] or 5 [awash] are covered by DEPARE and/or UNSARE objects of type Area.	4.5.2	E
1570	Check that no SLCONS object contains the attributes VERDAT and VERACC.	4.5.2	E
1571	Check that no BERTHS object contains the attribute VERDAT.	4.6.2	E
1572	Check that no DRYDOC object contains the attribute VERDAT.	4.6.6.1	E
1573	Check that any DRYDOC object is covered by a LNDARE object of type Area.	4.6.6.1	E
~~1574~~	~~Check that no DRYDOC object is bounded (except for the gate) by a separate object SLCONS or COALNE.~~	~~4.6.6.1~~	~~E~~
1575	Check that no FLODOC object contains the attributes VERDAT and VERACC.	4.6.6.2	E
~~1576~~	~~Check that no DOCARE object is bounded (except for the gate) by a separate object SLCONS or COALNE.~~	~~4.6.6.3~~	~~E~~
1577	Check that no DOCARE object shares the same geo-spatial position and geometry as a SEAARE object.	4.6.6.3	E
1578	Check that no GATCON object has an attribute value for VERDAT without an attribute value for VERCLR.	4.6.6.4	E
~~1579~~	~~Check that no GATCON object has an attribute value for VERACC without an attribute value for VERCLR.~~	~~4.6.6.4~~	~~E~~
1580	Check that any area GATCON object is covered by a DEPARE or LNDARE object of type Area.	4.6.6.4	W
1581	Check that no LOKBSN object shares the same geo-spatial position and geometry as a SEAARE object.	4.6.6.5	E

1582	Check that no GRIDRN object contains the attributes HORACC and VERACC.	4.6.6.6	E
1583	Check that no MORFAC object contains the attributes VERDAT and VERACC.	4.6.7.1	E
1584	Check that any area MORFAC object with a WATLEV attribute value of 1 [partly submerged at high water], 2 [always dry] or 6 [subject to inundation or flooding] is covered by a LNDARE object of type Area.	4.6.7.1	E
1585	Check that no PILPNT object contains the attributes VERDAT and VERACC.	4.6.7.2	E
1586	Check that no PONTON object contains the attribute VERACC.	4.6.7.3	E
1587	Check that no HULKES object contains the attributes HORACC and VERACC.	4.6.8	E
~~1588~~	~~Check that no object CRANES has an attribute value for VERACC without an attribute value for VERCLR.~~	~~4.6.9.3~~	~~E~~
1589	Check that any object having a value of (1) [under construction], (3) [under reclamation] or (5) [planned construction] for the attribute CONDTN contains the year or date of the information in SORDAT.	4.6.10	W
1590	Check that any LNDRGN object is covered (partially or entirely) by a LNDARE object of type Area (or contains a point or a line LNDARE).	4.7.1	W
1591	Check that no LNDELV object contains the attributes VERDAT and VERACC.	4.7.2	E
1592	Check that any COALNE object adjacent to a LNDRGN object with a value of (2) [marsh] for CATLND contains a value of (8) [marshy shore] for the attribute CATCOA, and that the coastline's spatial object has a value of (4) [approximate] for the attribute QUAPOS.	4.7.3	W
1593	Check that no SLOGRD object contains the attributes NATCON and NATQUA.	4.7.4	E
1594	Check that no SLOTOP object contains the attributes NATCON, NATQUA, VERACC and VERDAT.	4.7.5	E
1595	Check that no SLOTOP object with a value of (6) [cliff] for the attribute CATSLO shares the same geo-spatial position and geometry as a COALNE object.	4.7.5	W
~~1596~~	~~Check that no SLOGRD object with a value of (6) for the attribute CATSLO shares the same geo-spatial position and geometry as a COALNE object.~~	~~4.7.5~~	~~W~~
1597	Check that no RIVERS object shares the same geo-spatial position and geometry as a SEAARE object.	4.7.6	E
1598	Check that no RAPIDS object contains the attribute VERACC.	4.7.7.1	E
1599	Check that any RAPIDS or WATFAL object is covered by a RIVERS object of type area (or is coincident with a RIVERS object of type line) and a LNDARE or UNSARE object.	4.7.7.1 and 4.7.7.2	W
1600	Check that no WATFAL object contains the attribute VERACC.	4.7.7.2	E
1601	Check that no LAKARE object contains the attributes VERACC and VERDAT.	4.7.8	E
1602	Check that no LAKARE object shares the same geo-spatial position and geometry as a SEAARE object.	4.7.8	E
~~1603~~	~~Check that no LAKSHR objects exist.~~	~~4.7.8~~	~~E~~
1604	Check that any COALNE object adjacent to a LNDRGN object with a value of (15) [salt pan] for CATLND contains a value of (2) [flat coast] for the attribute CATCOA.	4.7.9	W
1605	Check that any ICEARE object is covered by a LNDARE or an UNSARE or a DEPARE object.	4.7.10	E
1606	Check that any COALNE object adjacent to an ICEARE object with a value of (5) [glacier] for CATICE contains a value of (6) [glacier (seaward end)] for the attribute CATCOA.	4.7.10	W

1607	Check that any COALNE object adjacent to a VEGATN object with a value of (7) [mangroves] for CATVEG contains a value of (7) [mangrove] for the attribute CATCOA and that the mangrove area's spatial object has a value of (4) [approximate] for the attribute QUAPOS.	4.7.11	W
1608	Check that no VEGATN object contains the attributes VERACC and VERDAT.	4.7.11	E
1609	Check that no CANALS object shares the same geo-spatial position and geometry as a SEAARE object.	4.8.1	E
1610	Check that no RAILWY object contains the attribute VERACC.	4.8.2	E
1611	Check that no TUNNELS object contains the attribute BURDEP.	4.8.3	E
1612	Check that any TUNNEL object is covered by LNDARE, DEPARE, UNSARE or DRGARE objects.	4.8.3	W
1613	Check, for any TUNNEL object, which covers a CANALS object, that the attributes HORACC, HORCLR, VERACC and VERCLR are not encoded.	4.8.3	E
1614	Check that no TUNNEL object has any other non-hydrographic object (RAILWY, ROADWY etc) encoded within it.	4.8.3	E
~~1615~~	~~Check that no object TUNNEL has an attribute value for VERACC without an attribute value for VERCLR.~~	~~4.8.3~~	~~E~~
1616	Check that no DAMCON object contains the attributes VERACC and VERDAT.	4.8.5	E
1617	Check that any DAMCON object of type Area is covered by a LNDARE object of type Area.	4.8.5	E
1618	Check that no DYKCON object contains the attributes VERDAT and VERACC.	4.8.7	E
1619	Check that any DYKCON object of type Area is covered by a LNDARE object of type Area.	4.8.7	E
1620	Check for any edge of a DYKCON object which is shared by both a LNDARE object of type area and a DEPARE, DRGARE or UNSARE object of type area, that it is also shared by a linear SLCONS object without a value for CATSLC.	4.8.7	E
~~1621~~	~~Check that no ROADWY object has a value of (7) for the attribute CATROD.~~	~~4.8.8~~	~~W~~
~~1622~~	~~Check that no object BRIDGE has an attribute value for VERACC without an attribute value for at least one of VERCLR, VERCCL or VERCOP.~~	~~4.8.10~~	~~E~~
1623	Check that if an object BRIDGE overlaps navigable water, its supports are encoded as PYLONS with a value of (4) [bridge pylon/tower] or (5) [bridge pier] for the attribute CATPYL.	4.8.10	E
~~1624~~	~~Check that no object CONVYR has an attribute value for VERACC without an attribute value for VERCLR.~~	~~4.8.11~~	~~E~~
1625	Check that, if one of the component objects (AIRARE or RUNWAY) of an airfield is encoded using a collection object, that only C_ASSO is used.	4.8.12	W
1626	Check that no AIRARE object contains the attribute CONVIS.	4.8.12	E
1627	Check that no RUNWAY object contains the attribute CONVIS.	4.8.12	E
1628	Check that no PRDARE object contains the attributes VERDAT and VERACC.	4.8.13	E
1629	Check that no BUAARE object contains the attributes VERDAT and VERACC.	4.8.14	E
1630	Check that no RIVERS, LOKBSN, DOCARE, LAKARE or CANALS object of type Area overlaps a BUAARE object.	4.8.14	E
1631	Check that no BUISGL object contains the attributes VERDAT and VERACC.	4.8.15	E
1632	Check that no SILTNK object contains the attributes VERDAT and VERACC.	4.8.15	E

1633	Check that no LNDMRK object contains the attributes VERDAT and VERACC.	4.8.15	E
1634	Check that no FNCLNE object contains the attributes VERDAT and VERACC.	4.8.16	E
1635	Check that no FORSTC object contains the attributes VERDAT and VERACC.	4.8.17	E
1636	Check that no PYLONS object contains the attributes VERDAT and VERACC.	4.8.18	E
1637	Check that any PYLONS object of type Area with a WATLEV attribute value of 1 [partly submerged at high water], 2 [always dry] or 6 [subject to inundation or flooding] is covered by a LNDARE object of type Area.	4.8.18	E
1638	Check that any picture files that form part of the ENC are in TIFF format.	4.8.20	E
1639	Check that no DEPCNT object contains the attribute VERDAT.	5.2	E
1640	Check that no SOUNDG object contains the attribute VERDAT.	5.3	E
1641	Check that no UWTROC object shares the same spatial position as a SOUNDG object.	5.3	E
1642	Check that no DEPARE object contains the attributes VERDAT and SOUACC.	5.4.1	E
~~1643~~	~~Check that where depth contours merge, a DEPARE (type Line) object is created, and that the value for VALDCO on the DEPCNT object is equal to the value for DRVAL1 on the DEPARE object.~~	~~5.4.1 and 5.4.3~~	~~W~~
1644	Check that the data set's outermost DEPARE objects of type Area are bounded by line spatial objects without associated geo objects.	5.4.2 (Fig.5)	W
~~1645~~	~~Check that the overall succession of DRVAL1 and DRVAL2 in the whole maritime area is continuous.~~	~~5.4.3~~	~~W~~
1646	Check for any DRGARE object, if a value exists for the attribute DRVAL2, that it is different to the value for DRVAL1.	5.5	W
1647	Check that no DRGARE object contains the attribute VERDAT.	5.5	E
1648	Check for any DRGARE object, if the attribute QUASOU is encoded, that the value is (10) [maintained depth] or (11) [not regularly maintained].	5.5	E
1649	Check that no DRGARE object has a value for SOUACC that is equivalent to or degrades the SOUACC attribute on the object M_QUAL.	5.5 and 2.2.3.1	E
1650	Check that no SWPARE object contains the attribute VERDAT.	5.6	E
1651	Check that any SWPARE object is covered by DEPARE and/or DRGARE objects of type Area.	5.6	E
1652	Check, for any SWPARE object that shares the same geo-spatial position and geometry as a M_QUAL object, that the values for DRVAL1 on both objects are the same.	5.6	E
1653	Check that where a SWPARE falls within an M_QUAL object and the attribute SOUACC is encoded for M_QUAL, that the SOUACC value refers to the area inside the SWPARE as well as the soundings outside.	5.6	E
1654	Check for any SWPARE object, if the attribute TECSOU is encoded, that the value is (6) [swept by wire-drag] , (8) [swept by vertical acoustic system] or (13) [swept by side-scan sonar].	5.6	E
1655	Check that no SWPARE object sharing the same geo-spatial position and geometry as a M_QUAL object contains the attribute POSACC if the SOUACC is encoded.	5.6	E
1656	Check that no UWTROC object contains the attribute VERDAT.	6.1.2	E

<table>
<tr><td>1657</td><td>Check for any UWTROC object that the combination of attribute values corresponds to the following table.

"undefined" means that no value is encoded.
"any value" means,
- for mandatory attribute: any predefined value or unknown value,
- for optional attribute: any predefined value or undefined.

For each specific case, when QUASOU and TECSOU (attributes of type List) are encoded, they should contain one or more values selected from the lists of allowed values given in the table.
In addition, other attributes which do not appear in the table may be encoded.
<table>
<tr><th>VALSOU</th><th>QUASOU</th><th>WATLEV</th><th>TECSOU
SOUACC</th></tr>
<tr><td rowspan="2">unknown</td><td>2 or undefined</td><td>3, 4 or 5</td><td>undefined</td></tr>
<tr><td>2 or undefined</td><td>unknown</td><td>undefined</td></tr>
<tr><td rowspan="2">< 0</td><td>1, 3, 4, 6, 8, 9 or undefined</td><td>4</td><td>any value</td></tr>
<tr><td>7</td><td>4</td><td>undefined</td></tr>
<tr><td rowspan="2">0</td><td>1, 3, 4, 6, 8, 9 or undefined</td><td>5</td><td>any value</td></tr>
<tr><td>7</td><td>5</td><td>undefined</td></tr>
<tr><td rowspan="2">> 0</td><td>1, 3, 4, 6, 8 or 9 or undefined</td><td>3</td><td>any value</td></tr>
<tr><td>7</td><td>3</td><td>undefined</td></tr>
</table>
</td><td>6.1.2</td><td>W</td></tr>
<tr><td>1658</td><td>Check that no WRECKS object contains the attributes VERDAT, VERACC and VERLEN.</td><td>6.2.1</td><td>E</td></tr>
<tr><td>1659</td><td>Check for any WRECKS object with VALSOU encoded with an explicit attribute value, if the value for EXPSOU is (1) [within the range of depth of the surrounding depth area] or if EXPSOU is not used, that the value for VALSOU is greater than DRVAL1 and less than or equal to DRVAL2 of the overlying DEPARE or DRGARE object.
Remark: This check must only be applied if both DRVAL1 and DRVAL2 for the overlying Group 1 object are encoded with explicit and different attribute values.</td><td>6.2.1</td><td>E</td></tr>
<tr><td>1660</td><td>Check for any WRECKS object with VALSOU encoded with an explicit attribute value, if the value for EXPSOU is (2) [shoaler than the range of depth of the surrounding depth area], that the value for VALSOU is less than or equal to DRVAL1 of the overlying DEPARE or DRGARE object.
Remark: This check must only be applied if DRVAL1 for the overlying Group 1 object is not encoded as “unknown".</td><td>6.2.1</td><td>E</td></tr>
<tr><td>1661</td><td>Check for any WRECKS object with VALSOU encoded with an explicit attribute value, if the value for EXPSOU is (3) [deeper than the range of depth of the surrounding depth area], that the value for VALSOU is:
• greater than DRVAL2 of the overlying DEPARE, or
• greater than DRVAL2 of the overlying DRGARE, when both DRVAL1 and DRVAL2 of the DRGARE are encoded, or
• greater than DRVAL1 of the overlying DRGARE, when only DRVAL1 of the DRGARE is encoded.
Remark: This check must only be applied if DRVAL2 for the overlying DEPARE object or DRVAL1 for the overlying DRGARE object are not encoded as “unknown”.</td><td>6.2.1</td><td>E</td></tr>
<tr><td>1662</td><td>Check that any area WRECKS or area OBSTRN object is covered by a DEPARE, LNDARE or UNSARE object of type Area.</td><td>6.2.1 and 6.2.2</td><td>E</td></tr>
</table>

<table>
<tr><td>1663</td><td colspan="6">Check for any WRECKS object that the combination of attribute values corresponds to the following table.

"undefined" means that no value is encoded.
"any value" means,
- for mandatory attribute: any predefined value or unknown value,
- for optional attribute: any predefined value or undefined.

For each specific case, when QUASOU, TECSOU and STATUS (attributes of type List) are encoded, they should contain one or more values selected from the lists of allowed values given in the table.
In addition, other attributes which do not appear in the table may be encoded.</td><td>6.2.1</td><td>W</td></tr>
<tr><td></td><td>VALSOU</td><td>WATLEV</td><td>CATWRK</td><td>QUASOU</td><td>HEIGHT</td><td colspan="2">TECSOU SOUACC</td></tr>
<tr><td></td><td rowspan="3">Undefined</td><td>3 or unknown</td><td>1, 2, 3 or unknown</td><td>2 or undefined</td><td>Undefined</td><td colspan="2">Undefined</td></tr>
<tr><td></td><td>4 or 5</td><td>Any value</td><td>2 or undefined</td><td>Undefined</td><td colspan="2">Undefined</td></tr>
<tr><td></td><td>1 or 2</td><td>4 or 5 or unknown</td><td>Undefined</td><td>Any value</td><td colspan="2">Undefined</td></tr>
<tr><td></td><td rowspan="3">unknown</td><td>3 or unknown</td><td>1, 2, 3 or undefined</td><td>2 or undefined</td><td>Undefined</td><td colspan="2">Undefined</td></tr>
<tr><td></td><td>4 or 5</td><td>Any value</td><td>2 or undefined</td><td>Undefined</td><td colspan="2">Undefined</td></tr>
<tr><td></td><td>1 or 2</td><td>4 or 5 or undefined</td><td>Undefined</td><td>Any value</td><td colspan="2">Undefined</td></tr>
<tr><td></td><td rowspan="2"><0</td><td>4</td><td>Any value</td><td>7</td><td>Undefined</td><td colspan="2">Undefined</td></tr>
<tr><td></td><td>4</td><td>Any value</td><td>1, 3, 4, 6, 8, 9 or undefined</td><td>Undefined</td><td colspan="2">Any value</td></tr>
<tr><td></td><td>0</td><td>5</td><td>Any value</td><td>1, 3, 4, 6, 8, 9 or undefined</td><td>Undefined</td><td colspan="2">Any value</td></tr>
<tr><td></td><td rowspan="2">> 0</td><td>3</td><td>1, 2, 3 or undefined</td><td>7</td><td>Undefined</td><td colspan="2">Undefined</td></tr>
<tr><td></td><td>3</td><td>1, 2, 3 or undefined</td><td>1, 3, 4, 6, 8, 9 or undefined</td><td>Undefined</td><td colspan="2">Any value</td></tr>
<tr><td>1664</td><td colspan="6">Check that no OBSTRN object contains the attribute VERACC or VERDAT.</td><td>6.2.2</td><td>E</td></tr>
<tr><td>1665</td><td colspan="6">Check for any OBSTRN object with VALSOU encoded with an explicit attribute value, if the value for EXPSOU is (1) [within the range of depth of the surrounding depth area] or if EXPSOU is not used, that the value for VALSOU is greater than DRVAL1 and less than or equal to DRVAL2 of the overlying DEPARE or DRGARE object.
Remark: This check must only be applied if both DRVAL1 and DRVAL2 for the overlying Group 1 object are encoded with explicit and different attribute values.</td><td>6.2.2</td><td>E</td></tr>
<tr><td>1666</td><td colspan="6">Check for any OBSTRN object with VALSOU encoded with an explicit attribute value, if the value for EXPSOU is (2) [shoaler than the range of depth of the surrounding depth area], that the value for VALSOU is less than or equal to DRVAL1 of the overlying DEPARE or DRGARE object.
Remark: This check must only be applied if DRVAL1 for the overlying Group 1 object is not encoded as “unknown".</td><td>6.2.2</td><td>E</td></tr>
</table>

<table>
<tr><td>1667</td><td>Check for any OBSTRN object with VALSOU encoded with an explicit attribute value, if the value for EXPSOU is (3) [deeper than the range of depth of the surrounding depth area], that the value for VALSOU is:
• greater than DRVAL2 of the overlying DEPARE, or
• greater than DRVAL2 of the overlying DRGARE, when both DRVAL1 and DRVAL2 for the DRGARE are encoded, or
• greater than DRVAL1 of the overlying DRGARE, when only DRVAL1 for the DRGARE is encoded.
Remark: This check must only be applied if DRVAL2 for the overlying DEPARE object or DRVAL1 for the overlying DRGARE object are not encoded as “unknown”.</td><td>6.2.2</td><td>E</td></tr>
<tr><td>1668</td><td>Check that no OBSTRN object has a value for the attribute PRODCT without a value of (2) [wellhead] or (3) [diffuser] for CATOBS.</td><td>6.2.2</td><td>W</td></tr>
<tr><td>1669</td><td>Check for any OBSTRN object that the combination of attribute values corresponds to the following table.

"undefined” means that no value is encoded.
"any value" means,
- for mandatory attribute: any predefined value or unknown value,
- for optional attribute: any predefined value or undefined.

For each specific case, when QUASOU and TECSOU (attributes of type List) are encoded, they should contain one or more values selected from the lists of allowed values given in the table.
In addition, other attributes which do not appear in the table may be encoded.
<table>
<tr><th>VALSOU</th><th>WATLEV</th><th>QUASOU</th><th>TECSOU
SOUACC</th><th>HEIGHT</th></tr>
<tr><td rowspan="3">unknown</td><td>3, 4, 5
or unknown</td><td>2
or undefined</td><td>Undefined</td><td>Undefined</td></tr>
<tr><td>1 or 2</td><td>Undefined</td><td>Undefined</td><td>Any value</td></tr>
<tr><td>7</td><td>Undefined</td><td>Undefined</td><td>Undefined</td></tr>
<tr><td rowspan="2">VALSOU < 0</td><td>4</td><td>1, 3, 4, 6, 8, 9
or undefined</td><td>Any value</td><td>Undefined</td></tr>
<tr><td>4</td><td>7</td><td>Undefined</td><td>Undefined</td></tr>
<tr><td>VALSOU = 0</td><td>5</td><td>1, 3, 4, 6, 8, 9
or undefined</td><td>Any value</td><td>Undefined</td></tr>
<tr><td rowspan="2">VALSOU > 0</td><td>3</td><td>1, 3, 4, 6, 8, 9
or undefined</td><td>Any value</td><td>Undefined</td></tr>
<tr><td>3</td><td>7</td><td>Undefined</td><td>Undefined</td></tr>
</table>
</td><td>6.2.2</td><td>W</td></tr>
<tr><td>1670</td><td>Check where a WRECKS or OBSTRN area includes other WRECKS or OBSTRN point objects, that the encoded values of the attributes EXPSOU, QUASOU, SOUACC, TECSOU, VALSOU and WATLEV for the area object are identical to the values for the shallowest point object.</td><td>6.3.2</td><td>W</td></tr>
<tr><td>1671</td><td>Check for any line object whose geometry is coincident with the geometry of an area object of the same class and attribute values except for attributes SORIND, SORDAT and SCAMIN.</td><td>Logical consistency</td><td>E</td></tr>
<tr><td>1672</td><td>Check for the occurrence of any point object lying inside an area object of the same class and attribute values, except for LNDARE, WRECKS and OBSTRN objects.</td><td>Logical consistency</td><td>E</td></tr>
</table>

1673	Check for any SBDARE objects:	7.1	W

	• That the different NATSUR values are separated by a slash or a comma, without a space. • That the attribute NATSUR does not begin or finish with a comma or a slash. • That the attribute NATSUR does not have more than one consecutive comma (or slash). • With a value for NATQUA, that the NATSUR and NATQUA attribute values have the same number of commas (or slashes). • That the attribute NATSUR does not contain the character chain " 9/ ".		
1674	Check for any SBDARE object of type Area, located in an intertidal area, that WATLEV has a value of (4) [covers and uncovers].	7.1(e) and 7.1 (g)	W
1675	Check that no SNDWAV object contains the attribute VERACC.	7.2.1	E
~~1676~~	~~Check that any RESARE object having a value of (24) for the attribute CATREA also has a value of (13) for the attribute RESTRN.~~	~~9.1.2~~	~~W~~
1677	Check that no MORFAC object has a value for the attribute BOYSHP unless the object contains a value of (7) [mooring buoy] for the attribute CATMOR.	4.6.7.1	E
1678	Check that no RECTRC object contains the attributes VERDAT and DRVAL2.	10.1.1	E
1679	Check for any object that attributes of type enumerated ('E'), float ('F'), integer ('I') or code string ('A') contain only one value.		E
~~1680~~	~~Check that no RECTRC object contains a value of (3) for the attribute STATUS.~~	~~10.1.1~~	~~W~~
1681	Check for any one way RECTRC object of type Line with a value for ORIENT encoded, that the direction of digitizing is consistent (i.e. deviation less than 5 degrees) with the direction of the traffic flow (as encoded in ORIENT).	10.1.1	E
1682	Check that any RECTRC or NAVLNE object belongs to a C_AGGR collection object, except for RECTRC objects with a value of (2) [not based on a system of fixed marks] for CATTRK, which may exist as isolated objects.	10.1.2	W
1683	If only one RECTRC and only one NAVLNE belong to the same C_AGGR collection object, check that the RECTRC and NAVLNE objects have the same or reciprocal attribute value for ORIENT.	10.1.2	W
1684	Check for any measured distance that each transit line and its beacons are aggregated into collection objects C_AGGR, and that these collection objects, along with the track to be followed, are aggregated into another C_AGGR object.	10.1.3	E
1685	Check that any object encoded as TSSBND is the outer limit of a traffic lane/separation scheme roundabout.	10.2.1.2	E
1686	Check that any object encoded as TSELNE separates either of the following: 1) Two traffic lanes, 2) Traffic lane and Inshore traffic zone.	10.2.1.3	W
1687	Check that any object encoded as TSEZNE separates either of the following: 1) Two traffic lanes, 2) Traffic lane and Inshore traffic zone, 3) Centre of roundabout.	10.2.1.4	W
1688	Check that any object encoded as TSSCRS encodes a crossing between at least four traffic lanes.	10.2.1.5	E
1689	Check that no TSSCRS object overlaps a TSEZNE object.	10.2.1.5	E
1690	Check that no TSSRON object overlaps a TSEZNE object.	10.2.1.6	E
1691	Check that no DWRTPT object contains the attributes VERDAT and DRVAL2.	10.2.2.1	E
1692	Check that any DWRTPT object is covered by DEPARE and/or DRGARE objects.	10.2.2.1	E
1693	Check for any DWRTPT and DWRTCL object, that if the attribute OBJNAM is encoded, the DWRTPT or DWRTCL object is not aggregated in a collection object.	10.2.2.1	W

1694	Check for any one way DWRTCL object with a value for ORIENT encoded,	10.2.2.2	E

	the direction of digitizing is consistent (i.e. deviation less than 5 degrees) with the direction of the traffic flow (as encoded in ORIENT).		
1695	Check that no DWRTCL object contains the attributes VERDAT and DRVAL2.	10.2.2.2	E
1696	Check for any one way RCRTCL object with a value for ORIENT encoded, the direction of digitizing is consistent (i.e. deviation less than 5 degrees) with the direction of the traffic flow (as encoded in ORIENT).	10.2.4	E
1697	Check that no RCRTCL object contains the attributes VERDAT and DRVAL2.	10.2.4	E
1698	Check that no TWRTPT object contains the attributes VERDAT and DRVAL2.	10.2.6	E
1699	Check that no FAIRWY object contains the attribute VERDAT.	10.4	E
1700	Check that no TESARE object overlaps an EXEZNE object.	11.2	E
1701	Check that no CBLSUB object contains the attribute VERDAT.	11.5.1	E
1702	Check that no CBLSUB object that has a value of (4) [not in use] for the attribute STATUS has a value for the attribute CATCBL.	11.5.1	W
1703	Check for any CBLSUB object, if the attribute CATCBL is encoded, that the value is (1) [power line], (4) [telephone], (5) [telegraph] or (6) [mooring cable/chain].	11.5.1	E
1704	Check that no CBLOHD object contains an attribute value for VERDAT, without an attribute value for at least one of VERCLR or VERCSA.	11.5.2	E
~~1705~~	~~Check that no CBLOHD object contains an attribute value for VERACC, without an attribute value for at least one of VERCLR or VERCSA.~~	~~11.5.2~~	~~E~~
1706	Check for any CBLOHD, CBLSUB, PIPSOL or PIPOHD object, if the attribute CONDTN is encoded, that the value is (1) [under construction] or (5) [planned construction].	11.5.1 11.5.2 11.6.1 and 11.6.3	E
1707	Check for any CBLARE object, if the attribute CATCBL is encoded, that the value is (1) [power line], (4) [telephone] or (5) [telegraph].	11.5.3	E
1708	Check that no PIPSOL object contains the attributes VERDAT and VERACC.	11.6.1	E
1709	Check that no PIPSOL object that has a value of (4) [not in use] for the attribute STATUS has a value for the attribute CATPIP.	11.6.1	W
~~1710~~	~~Check that no PIPOHD object has an attribute value for VERACC without an attribute value for VERCLR.~~	~~11.6.3~~	~~E~~
~~1711~~	~~Check that no PIPOHD object has an attribute value for VERDAT without an attribute value for VERCLR.~~	~~11.6.3~~	~~E~~
1712	Check that no PIPOHD object that has a value of (4) [not in use] for the attribute STATUS has a value for the attributes CATPIP or PRODCT.	11.6.3	W
1713	Check that no PIPARE object contains the attribute CONDTN.	11.6.4	E
~~1714~~	~~Check that any OBSTRN object that has a value of (2) for the attribute CATOBS also has a value of (4) for the attribute STATUS.~~	~~11.7.1 and 6.2.2~~	~~W~~
1715	Check that no OFSPLF object contains the attributes VERDAT and VERACC.	11.7.2	E
1716	Check that no OSPARE object contains the attribute VERACC.	11.7.4	E
1717	Check that no FSHFAC object contains the attribute VERACC.	11.9.1	E
1718	Check that no MARCUL object contains the attribute VERDAT.	11.9.2	E

<table>
<tr><td>1719</td><td colspan="3">Check for any MARCUL object that the combination of attribute values corresponds to the following table.

"undefined" means that no value is encoded.
"any value" means,
- for mandatory attribute: any predefined value or unknown value,
- for optional attribute: any predefined value or undefined.

For each specific case, when QUASOU (attribute of type List) is encoded, it should contain one or more values selected from the list of allowed values given in the table.
In addition, other attributes which do not appear in the table may be encoded.</td><td>11.9.2</td><td>W</td></tr>
<tr><td></td><td>WATLEV</td><td>VALSOU</td><td>QUASOU</td><td></td></tr>
<tr><td></td><td>1, 2, 5 or 7</td><td>Undefined</td><td>Undefined</td><td></td></tr>
<tr><td></td><td>4</td><td>VALSOU < 0</td><td>1, 3, 4, 6, 7, 8, 9 or undefined</td><td></td></tr>
<tr><td></td><td></td><td>Undefined or unknown</td><td>2 or undefined</td><td></td></tr>
<tr><td></td><td>5</td><td>VALSOU = 0</td><td>1, 3, 4, 6, 8, 9 or undefined</td><td></td></tr>
<tr><td></td><td></td><td>Undefined or unknown</td><td>2 or undefined</td><td></td></tr>
<tr><td></td><td>3</td><td>VALSOU > 0</td><td>1, 3, 4, 6, 7, 8, 9 or undefined</td><td></td></tr>
<tr><td></td><td></td><td>Unknown</td><td>2 or undefined</td><td></td></tr>
<tr><td></td><td>Unknown</td><td>Unknown</td><td>2 or undefined</td><td></td></tr>
<tr><td>1720</td><td colspan="3">Check that no ICEARE object contains the attributes VERDAT and VERACC.</td><td>11.13.1</td><td>E</td></tr>
<tr><td>1721</td><td colspan="3">Check that no RADRFL object is attached to a navigational aid having CONRAD as a relevant attribute (the navigational aid must use CONRAD = (3) [radar conspicuous (has reflector radar)]).</td><td>12.1.1</td><td>E</td></tr>
<tr><td>1722</td><td colspan="3">Check that any navigational aid equipment object is a slave to a navigational aid structure object or another navigational aid equipment object.
When two objects (including one DAYMAR) contained in the list of structure objects are part of the navigational aid, then the DAYMAR object must be considered as an equipment object.

NOTE: CRANES, FLODOC, FORSTC, FSHFAC, HULKES, PONTON, OBSTRN, PYLONS, SILTNK and WRECKS objects must be considered as possible structure objects, in addition to the list given in Annex A (12.1.1).</td><td>12.1.2
and
12.1.1</td><td>W</td></tr>
<tr><td>1723</td><td colspan="3">Check that all point objects comprising a navigational aid are pointing to the same point spatial object.</td><td>12.1.2</td><td>E</td></tr>
<tr><td>1724</td><td colspan="3">Check that no navigational aid equipment object contains a value for OBJNAM equivalent to the OBJNAM value of the master object.</td><td>12.1.2</td><td>W</td></tr>
<tr><td>1725</td><td colspan="3">Check, for a navigational aid containing only equipment objects that point to the same point spatial object, that a DAYMAR object (if one exists) is encoded as the master object else a LIGHTS object (if one exists) is encoded as the master object.</td><td>12.1.2</td><td>W</td></tr>
<tr><td>1726</td><td colspan="3">Check that the entire area of the data set is covered by one or more M_NSYS objects, with a value for the attribute MARSYS indicating the buoyage system in operation.</td><td>12.2</td><td>E</td></tr>
<tr><td>1727</td><td colspan="3">Check that no M_NSYS object with a value for MARSYS overlaps any other M_NSYS object that contains a value for MARSYS.</td><td>12.2</td><td>E</td></tr>
<tr><td>1728</td><td colspan="3">Check that no M_NSYS object with a value for ORIENT overlaps any other M_NSYS object that contains a value for ORIENT.</td><td>12.2</td><td>E</td></tr>
</table>

1729	Check for any geo object forming part of a navigational aid (buoy or beacon), that the combination of characteristics for structure, topmark and lights conforms to the IALA system being used (given in MARSYS of the geo object or, if not encoded, in MARSYS of the meta-object M_NSYS). This check must not be applied to objects having a value of (9) [no system] or (10) [other system] for the attribute MARSYS, and to slave objects if the master object has a value of (9) [no system] or (10) [other system] for the attribute MARSYS. Optional attributes may be either encoded or undefined. Mandatory attributes must be encoded with explicit values (i.e. not "unknown").	12.2 and Encoding Bulletin EB19	W
1730	Check that no BCNCAR object contains the attributes VERDAT and VERACC.	12.3.1	E
1731	Check that no BCNISD object contains the attributes VERDAT and VERACC.	12.3.1	E
1732	Check that no BCNLAT object contains the attributes VERDAT and VERACC.	12.3.1	E
1733	Check that no BCNSAW object contains the attributes VERDAT and VERACC.	12.3.1	E
1734	Check that no BCNSPP object contains the attributes VERDAT and VERACC.	12.3.1	E
1735	Check that no Beacon object contains a value for the attribute MARSYS that is identical to the value for MARSYS within the object M_NSYS that covers the Beacon object.	12.3.1	E
1736	Check that no DAYMAR object contains the attributes VERDAT and VERACC.	12.3.3	E
1737	Check that no BOYCAR object contains the attribute VERACC.	12.4.1	E
1738	Check that no BOYINB object contains the attribute VERACC.	12.4.1	E
1739	Check that no BOYISD object contains the attribute VERACC.	12.4.1	E
1740	Check that no BOYLAT object contains the attribute VERACC.	12.4.1	E
1741	Check that no BOYSPP object contains the attribute VERACC.	12.4.1	E
1742	Check that no BOYSAW object contains the attribute VERACC.	12.4.1	E
1743	Check that no Buoy object contains a value for the attribute MARSYS that is identical to the value for MARSYS within the object M_NSYS that covers the Buoy object.	12.4.1	E
1744	Check that no LITVES object contains the attributes HORACC and VERACC.	12.4.2	E
1745	Check that no LITFLT object contains the attributes HORACC and VERACC.	12.4.2	E
1746	Check that no TOPMAR object contains the attributes VERACC, VERDAT, VERLEN, HEIGHT and MARSYS.	12.6	E
1747	Check that no RETRFL object contains the attributes VERACC and MARSYS.	12.7	E
1748	Check that no RETRFL object contains the attribute VERDAT.	12.7	E
1749	Check that no LIGHTS object contains the attribute VERACC.	12.8.1	E
1750	Check that no LIGHTS object that is a slave to a buoy object, has a value for the attribute HEIGHT.	12.8.1	E
1751	Check that no LIGHTS object has a value for ORIENT without a value of (1) [directional function] or (16) [moiré effect] for CATLIT.	12.8.1 and Appendix B.1 (3.5.2)	E
1752	Check that no LIGHTS object with a value of (1) [fixed] for LITCHR contains the attributes SIGGRP, SIGPER and SIGSEQ.	12.8.1	E
~~1753~~	~~Check that no LIGHTS object has an attribute value for VERDAT without an attribute value for HEIGHT.~~	~~12.8.1~~	~~E~~
1754	Check that no LIGHTS object has an attribute value for VERDAT that is identical to the VERDAT value within M_VDAT.	12.8.1	E

1755	Check that no LIGHTS object has an attribute value for VERDAT that is identical to the value given in the Vertical Datum subfield (VDAT) of the Data Set Parameter field (DSPM).	12.8.1	E
1756	Check that no LIGHTS object having a value of (4) [leading light] for the attribute CATLIT has a value for ORIENT, unless CATLIT also contains a value of (1) [directional function].	12.8.6.4 and 12.8.6.5	E
1757	Check that any LIGHTS object having values of (19) [horizontally disposed] or (20) [vertically disposed] for the attribute CATLIT also has the number of lights encoded in MLTYLT.	12.8.7	E
1758	Check that no LIGHTS object has a value of (17) [emergency] for the attribute CATLIT without another LIGHTS object encoded with the same spatial position.	12.8.7	E
1759	Check that no RDOSTA object contains a value for the attribute ORIENT without a value of (2) [directional radiobeacon] for the attribute CATROS.	12.9.1	E
1760	Check that no RADSTA object contains the attributes VERACC and VERDAT.	12.11.3	E
1761	Check that no RADRFL object contains the attributes VERACC and VERDAT.	12.12	E
1762	Check that no RADRFL object is encoded on an Area or Point type object, except for DAYMAR or PILPNT objects.	12.12	E
1763	Check that the Relationship Indicator [RIND] subfield of the Feature Record to Feature object Pointer [FFPT] field for any C_ASSO or C_AGGR object is set to (3) [peer].	15 and Appendix B.1 (3.9)	E
1764	Check that no permanent object with a value of (1) [permanent] for the attribute STATUS has PERSTA and/or PEREND encoded.	2.1.5.1 and logical consistency	E
1765	Check when both M_QUAL and M_ACCY objects are used in a cell, that these meta objects provide exhaustive, non-overlapping coverage of those areas covered by M_COVR objects with CATCOV = 1 [coverage available].	2.2.4.1	W
1766	Check for any attribute PICREP, TXTDSC and NTXTDS that the attribute value only contains one file name.	2.3 and 4.8.20	E
1767	Check for any edge which fulfils the following conditions: • it is shared by an area SBDARE object with WATLEV = 4 [covers and uncovers], and • it is shared by an area DEPARE or DRGARE object, with DRVAL2 $\leq$ 0, and • it is shared by an area DEPARE or DRGARE object, with DRVAL1 $\geq$ 0, or by an area UNSARE object, and • it is not shared by a line DAMCON, GATCON, SLCONS or LNDARE that it is also shared by a DEPCNT object with VALDCO = 0.	5.2	W
1768	Check for any SOUNDG object, that any depth value is greater than DRVAL1 of the overlying DEPARE or DRGARE object. Remark: This check must only be applied if DRVAL1 for the overlying DEPARE or DRGARE object is encoded with an explicit value.	5.3	W

1769	Check for any SOUNDG object, if the value for EXPSOU is not (3) [deeper than the range of depth of the surrounding depth area], that any depth value is shoaler than or equal to DRVAL2 of the overlying DEPARE object. Remark: This check must only be applied if DRVAL2 for the overlying DEPARE object is encoded with an explicit value.	5.3	W
1770	Check for any SOUNDG object, if the value for EXPSOU is (3) [deeper than the range of depth of the surrounding depth area], that any depth value is: • greater than DRVAL2 of the overlying DEPARE, or • greater than DRVAL2 of the overlying DRGARE, when both DRVAL1 and DRVAL2 for the DRGARE are encoded, or • greater than DRVAL1 of the overlying DRGARE, when only DRVAL1 for the DRGARE is encoded. Remark: This check must only be applied if DRVAL2 for the overlying DEPARE object or DRVAL1 for the overlying DRGARE object are not encoded as “unknown”.	5.3	W
1771	Check for any edge which is shared by a DEPCNT (VALDCO) and two area DEPARE (DRVAL1, DRVAL2), but by no line DEPARE, that: • (Maximum value of DRVAL2) > VALDCO > (Minimum value of DRVAL1), and • (Minimum value of DRVAL2) = VALDCO	5.4.3	W
1772	Check for any UWTROC object with VALSOU encoded with an explicit attribute value, if the value for EXPSOU is (1) [within the range of depth of the surrounding depth area] or if EXPSOU is not used , that the value for VALSOU is greater than DRVAL1 and less than or equal to DRVAL2 of the overlying DEPARE or DRGARE object. Remark: This check must only be applied if both DRVAL1 and DRVAL2 for the overlying Group 1 object are encoded with explicit and different attribute values.	6.1.2	E
1773	Check for any UWTROC object with VALSOU encoded with an explicit attribute value, if the value for EXPSOU is (2) [shoaler than the range of depth of the surrounding depth area], that the value for VALSOU is less than or equal to DRVAL1 of the overlying DEPARE or DRGARE object. Remark: This check must only be applied if DRVAL1 for the overlying Group 1 object is not encoded as “unknown”.	6.1.2	E
1774	Check for any UWTROC object with VALSOU encoded with an explicit attribute value, if the value for EXPSOU is (3) [deeper than the range of depth of the surrounding depth area], that the value for VALSOU is: • greater than DRVAL2 of the overlying DEPARE, or • greater than DRVAL2 of the overlying DRGARE, when both DRVAL1 and DRVAL2 for the DRGARE are encoded, or • greater than DRVAL1 of the overlying DRGARE, when only DRVAL1 for the DRGARE is encoded. Remark: This check must only be applied if DRVAL2 for the overlying DEPARE object or DRVAL1 for the overlying DRGARE object are not encoded as “unknown”.	6.1.2	E

<table>
<tr><td>1775</td><td>Check for any equipment object (see UOC 12.1.1) which is situated within a DEPARE, DRGARE or UNSARE, that:
• it has a navigational aid structure as master, or
• it shares the same spatial object as a point FLODOC, HULKES, LNDARE, PONTON or PYLONS object, or
• it is situated on a line CBLOHD, CONVYR, COALNE, DAMCON (with CATDAM = 3 [flood barrage]), BRIDGE, FLODOC, LNDARE, MORFAC, PIPOHD, PONTON or SLCONS object, or
• it is situated within an area CONVYR or BRIDGE object.</td><td>12.1.1 and 12.8.8</td><td>W</td></tr>
<tr><td>1776</td><td>Check that any LIGHTS object having value 6, 7, 9, 10, 11 or 28 for LITCHR is encoded with the corresponding value for SIGGRP:
• LITCHR = 6 [ultra quick-flashing], then SIGGRP = (1)
• LITCHR = 7 [isophase], then SIGGRP = (1)
• LITCHR = 9 [interrupted quick-flashing], then SIGGRP = ()
• LITCHR = 10 [interrupted very quick-flashing], then SIGGRP = ()
• LITCHR = 11 [interrupted ultra quick-flashing], then SIGGRP = ()
• LITCHR = 28 [alternating], then SIGGRP = ()</td><td>12.8.3</td><td>W</td></tr>
<tr><td>1777</td><td>Check that all the pointers of any collection object in a cell reference objects that exist in that cell.</td><td>15</td><td>W</td></tr>
<tr><td>1778</td><td>Check that no LIGHTS object has CATLIT = 1 [directional function] with the angle defined by SECTR1 and SECTR2 being greater than 10 degrees.</td><td>12.8.6.5 and Appendix A Ch.2 (code 37)</td><td>W</td></tr>
<tr><td>1779</td><td>Check that no area DEPARE object has DRVAL1 equal to DRVAL2.</td><td>5.4 and logical consistency</td><td>E</td></tr>
<tr><td>1780</td><td>Check that for a SBDARE object, if NATSUR is encoded, the associated attribute value for NATQUA (if encoded) is correct (the symbol "x" indicates the possible attribute combinations):
<table>
<tr><th>NATQUA
NATSUR</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th><th>9</th><th>10</th></tr>
<tr><td>1</td><td></td><td></td><td></td><td></td><td>x</td><td>x</td><td>x</td><td>x</td><td>x</td><td>x</td></tr>
<tr><td>2</td><td></td><td></td><td></td><td></td><td>x</td><td>x</td><td>x</td><td></td><td></td><td>x</td></tr>
<tr><td>3</td><td>x</td><td>x</td><td>x</td><td></td><td>x</td><td>x</td><td>x</td><td></td><td></td><td>x</td></tr>
<tr><td>4</td><td>x</td><td>x</td><td>x</td><td></td><td></td><td>x</td><td></td><td>x</td><td>x</td><td>x</td></tr>
<tr><td>5</td><td>x</td><td>x</td><td>x</td><td></td><td></td><td></td><td></td><td>x</td><td>x</td><td></td></tr>
<tr><td>6</td><td>x</td><td>x</td><td>x</td><td></td><td></td><td></td><td></td><td>x</td><td>x</td><td></td></tr>
<tr><td>7</td><td>x</td><td>x</td><td>x</td><td></td><td></td><td></td><td></td><td>x</td><td>x</td><td></td></tr>
<tr><td>8</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>x</td><td>x</td><td></td></tr>
<tr><td>9</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>x</td><td>x</td><td></td></tr>
<tr><td>11</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>x</td><td></td><td></td></tr>
<tr><td>14</td><td></td><td></td><td></td><td>x</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>17</td><td>x</td><td>x</td><td>x</td><td>x</td><td></td><td></td><td></td><td></td><td>x</td><td></td></tr>
<tr><td>18</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>x</td><td>x</td><td></td></tr>
</table></td><td>logical consistency</td><td>W</td></tr>
<tr><td>1781</td><td>Check that any BUISGL or LNDMRK object which is part of a master/slave relationship and references a LIGHTS object (except with the value of (6) [air obstruction light], (8) [flood light] or (9) [strip light] for CATLIT) as slave, has a value of (33) [light support] for the attribute FUNCTN.</td><td>12.3.2 and S52</td><td>W</td></tr>
<tr><td>1782</td><td>Check that SWPARE objects do not overlap.</td><td>logical consistency</td><td>W</td></tr>
</table>

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1783	Check that no object of type Area with: • WATLEV = 4 [covers and uncovers] overlaps a DEPARE object with DRVAL1 >= 0. • WATLEV = 5 [awash] overlaps a DEPARE object with DRVAL1 **>** 0.	logical consistency	W
1784	Check for any spatial object that no attribute HORDAT, POSACC, or QUAPOS is populated with a missing value (unknown).	logical consistency	W
1785	Check that only LNDMRK objects having CATLMK = 18 [windmill] or 19 [windmotor], have been encoded with CONDTN = 4 [wingless].	Logical consistency	W
1786	Check that any objects of type Area with WATLEV = 2 [always dry] are covered by LNDARE objects of type Area.	Logical consistency	W
1787	Check for any objects NAVLNE and RECTRC sharing an edge that they have the same or reciprocal attribute value for ORIENT.	Logical consistency	W
1788	Check that when one object NAVLNE and one object RECTRC share an edge, they belong to the same C_AGGR object.	10.1.2	W
1789	Check for any object DWRTCL, NAVLNE, RECTRC and RCRTCL of type Line with a value for ORIENT encoded, that the orientation of the spatial geometry is consistent (i.e. deviation less than 5 degrees) with the attribute value (or the reciprocal value) encoded in ORIENT.	Logical consistency	W
1790	Check for any LIGHTS having ORIENT encoded with an explicit value, that: • SECTR1 and SECTR2 are not populated, or • it is not aggregated to a RECTRC or a NAVLNE in a collection object C_AGGR, or • the structure object which is the master of this LIGHTS in a master/slave relationship is not aggregated to a RECTRC or a NAVLNE in a collection object C_AGGR.	Encoding Bulletin EB9	W
1791	Check for any NAVLNE having CATNAV = 3 [leading line bearing a recommended track] that a RECTRC with CATTRK=1 [based on a system of fixed marks] shares a part of the line geometry used for the NAVLNE, and vice versa.	logical consistency	W
1792	Check that no cell crosses the 180° meridian.	Encoding Bulletin EB18	W
1793	Check for any master/slave relationship which references one or more LIGHTS, that there is at least one LIGHTS which is not encoded with LITVIS = 6 [visibility deliberately restricted] or LITVIS = 7 [obscured].	logical consistency	W
1794	Check for any LIGHTS object having CATLIT = 1 [directional function] and which is a slave in a master/slave relationship, that the master object is not a BOYCAR, BOYINB, BOYISD, BOYLAT, BOYSAW, BOYSPP, LITFLT or LITVES.	logical consistency	W
1795	Check for any master object in a master/slave relationship containing temporal attribution (DATEND, DATSTA, PEREND, PERSTA) that its slave objects also contain the same temporal attributes.	logical consistency	W
~~1796~~	~~Check that no SOUNDG object has a value of (2) [shoaler than the range of depth of the surrounding depth area] for the attribute EXPSOU.~~	~~Encoding Bulletin EB27~~	~~W~~

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1797	Check that none of the following feature object and geometric primitive combinations, which do not display in ECDIS, are present in the dataset: • BRIDGE of type point; • DAMCON of type point, with attribute CATDAM ≠ 3; • GRIDRN of type point; • PIPSOL of type point; • PRDARE of type point, with attribute CATPRA = [Empty (null) value]; • RAPIDS of type point; • ROADWY of type point; • SLOGRD of type area, with attributes CATSLO = 1, 2, 3, 4, 5, 7 and CONRAD ≠ 1, or CATSLO = [Empty (null) value]; • TUNNEL of type point; • VEGATN of type point or area, with attribute CATVEG = 1, 10, 11, 12, [Empty (null) value]; and • WATFAL of type point.	Encoding Bulletin EB29	W

2.5 Checks relating to allowable attribute values for particular object classes

2000	Check for any object that attributes of type "L" (list) and "E" (enumerated) only contain allowable values listed in the following table for the given object class. x-y-z allowable values (alone or in a list) * all the pre-defined attribute values as listed in S-57 3.1 Appendix A, Chapter 2 are allowed. # the attribute is mandatory, and the missing value (Unknown) is allowed. (#) the attribute is mandatory, but the missing value (Unknown) is prohibited (no logical sense).	logical consistency	W

Attribute	**Object Class**	code	Allowable attribute values
BCNSHP		2	
	BCNCAR	5	* #
	BCNISD	6	* #
	BCNLAT	7	* #
	BCNSAW	8	* #
	BCNSPP	9	* #
BUISHP		3	
	BUISGL	12	*
	SILTNK	125	*
BOYSHP		4	
	BOYCAR	14	* #
	BOYINB	15	* #
	BOYISD	16	* #
	BOYLAT	17	* #
	BOYSAW	18	* #
	BOYSPP	19	* #
	MORFAC	84	*
CATAIR		7	
	AIRARE	2	*
CATACH		8	
	ACHBRT	3	*
	ACHARE	4	*
CATBRG		9	
	BRIDGE	11	* #
CATBUA		10	
	BUAARE	13	*
CATCBL		11	
	CBLARE	20	1-4-5 *(see check 1707)*
	CBLOHD	21	1-3-4-5
	CBLSUB	22	1-4-5-6 *(see check 1703)*

CATCAN		12	
	CANALS	23	*

CATCAM		13	
	BCNCAR	5	* #
	BOYCAR	14	* #

CATCHP		14	
	CHKPNT	28	*

CATCOA		15	
	COALNE	30	*

CATCTR		16	
	CTRPNT	33	*

CATCON		17	
	CONVYR	34	*

CATCOV		18	
	M_COVR	302	* (#)

CATCRN		19	
	CRANES	35	*

CATDAM		20	
	DAMCON	38	*

CATDIS		21	
	DISMAR	44	*

CATDOC		22	
	DOCARE	45	*

CATDPG		23	
	DMPGRD	48	*

CATFNC		24	
	FNCLNE	52	*

CATFRY		25	
	FERYRT	53	* #

CATFIF		26	
	FSHFAC	55	*

CATFOG		27	
	FOGSIG	58	* #

CATFOR		28	
	FORSTC	59	*

CATGAT		29	

	GATCON	61	*
CATHAF		30	
	HRBFAC	64	* #
CATHLK		31	
	HULKES	65	*
CATICE		32	
	ICEARE	66	* #
CATINB		33	
	BOYINB	15	*
CATLND		34	
	LNDRGN	73	* #
CATLMK		35	
	LNDMRK	74	* #
CATLAM		36	
	BCNLAT	7	* #
	BOYLAT	17	* #
CATLIT		37	
	LIGHTS	75	* #
CATMFA		38	
	MARCUL	82	*
CATMPA		39	
	MIPARE	83	*
CATMOR		40	
	MORFAC	84	* #
CATNAV		41	
	NAVLNE	85	* #
CATOBS		42	
	OBSTRN	86	*
CATOFP		43	
	OFSPLF	87	*
CATOLB		44	
	OILBAR	89	*
CATPLE		45	
	PILPNT	90	*
CATPIL		46	
	PILBOP	91	*

CATPIP		47	
	PIPARE	92	*
	PIPOHD	93	2-3-4-6
	PIPSOL	94	*

CATPRA		48	
	OSPARE	88	1-2-5-8-9
	PRDARE	97	* #

CATPYL		49	
	PYLONS	98	* #

CATRAS		51	
	RADSTA	102	*

CATRTB		52	
	RTPBCN	103	* #

CATROS		53	
	RDOSTA	105	*

CATTRK		54	
	DWRTCL	40	* #
	RCRTCL	108	* #
	RECTRC	109	* #
	TWRTPT	152	*

CATRSC		55	
	RSCSTA	111	*

CATREA		56	
	RESARE	112	* #

CATROD		57	
	ROADWY	116	1-2-3-4-5-6 *(replaces check 1621)*

CATRUN		58	
	RUNWAY	117	*

CATSEA		59	
	SEAARE	119	* #

CATSLC		60	
	SLCONS	122	*

CATSIT		61	
	SISTAT	123	* #

CATSIW		62	
	SISTAW	124	* #

CATSIL		63	
	SILTNK	125	*

CATSLO		64	
	SLOTOP	126	*
	SLOGRD	127	*

CATSCF		65	
	SMCFAC	128	* #

CATSPM		66	
	BCNSPP	9	* #
	BOYSPP	19	* #
	DAYMAR	39	*

CAT_TS		188	
	TS_FEB	160	* #

CATTSS		67	
	ISTZNE	68	*
	TSELNE	145	*
	TSSBND	146	*
	TSSCRS	147	*
	TSSLPT	148	*
	TSSRON	149	*
	TSEZNE	150	*

CATVEG		68	
	VEGATN	155	* #

CATWAT		69	
	WATTUR	156	* #

CATWED		70	
	WEDKLP	158	*

CATWRK		71	
	WRECKS	159	* #

CATZOC		72	
	M_QUAL	308	* (#)

COLOUR		75	
	BCNCAR	5	* #
	BCNISD	6	* #
	BCNLAT	7	* #
	BCNSAW	8	* #
	BCNSPP	9	* #
	BRIDGE	11	*
	BUISGL	12	*
	BOYCAR	14	* #
	BOYINB	15	* #
	BOYISD	16	* #
	BOYLAT	17	* #
	BOYSAW	18	* #
	BOYSPP	19	* #
	COALNE	30	*

	CONVYR	34	*
	CRANES	35	*
	DAMCON	38	*
	DAYMAR	39	* #
	FNCLNE	52	*
	FLODOC	57	*
	HULKES	65	*
	LNDMRK	74	*
	LIGHTS	75	1-3-4-5-6-8-9-10-11-12-13 #
	LITFLT	76	* #
	LITVES	77	* #
	MORFAC	84	*
	NEWOBJ	163	*
	OFSPLF	87	*
	PILPNT	90	*
	PYLONS	98	*
	RETRFL	113	1-3-4-5-6-7-8-9-10-11-12-13
	SBDARE	121	*
	SLCONS	122	*
	SILTNK	125	*
	SLOTOP	126	*
	SLOGRD	127	*
	TOPMAR	144	*

COLPAT		76	
	BCNCAR	5	* #
	BCNISD	6	* #
	BCNLAT	7	* #
	BCNSAW	8	* #
	BCNSPP	9	* #
	BRIDGE	11	* #
	BUISGL	12	* #
	BOYCAR	14	* #
	BOYINB	15	* #
	BOYISD	16	* #
	BOYLAT	17	* #
	BOYSAW	18	* #
	BOYSPP	19	* #
	CONVYR	34	* #
	CRANES	35	* #
	DAMCON	38	* #
	DAYMAR	39	* #
	FNCLNE	52	* #
	FLODOC	57	* #
	HULKES	65	* #
	LNDMRK	74	* #
	LITFLT	76	* #
	LITVES	77	* #
	MORFAC	84	* #
	NEWOBJ	163	* #
	OFSPLF	87	* #
	PILPNT	90	* #
	PYLONS	98	* #
	RETRFL	113	* #

	SLCONS	122	* #
	SILTNK	125	* #
	TOPMAR	144	* #

CONDTN		81		
	AIRARE	2	1-2-3-5	
	BCNCAR	5	1-2-5	
	BCNISD	6	1-2-5	
	BCNLAT	7	1-2-5	
	BCNSAW	8	1-2-5	
	BCNSPP	9	1-2-5	
	BRIDGE	11	1-2-5	
	BUISGL	12	1-2-5	
	BUAARE	13	1-2-5	
	CBLOHD	21	1-5	*(see check 1706)*
	CBLSUB	22	1-5	*(see check 1706)*
	CANALS	23	1-2-3-5	
	CAUSWY	26	1-2-3-5	
	CONVYR	34	1-2-5	
	CRANES	35	1-2-5	
	DAMCON	38	1-2-3-5	
	DOCARE	45	1-2-3-5	
	DRYDOC	47	1-2-3-5	
	DYKCON	49	1-2-3-5	
	FNCLNE	52	1-2-5	
	FLODOC	57	1-2-3-5	
	FORSTC	59	1-2-5	
	GATCON	61	1-2-5	
	HRBFAC	64	1-2-3-5	
	HULKES	65	1-2-5	
	LNDARE	71	1-3-5	
	LNDMRK	74	1-2-4-5	
	MORFAC	84	1-2-5	
	NEWOBJ	163	*	
	OBSTRN	86	1-2-5	
	OFSPLF	87	1-2-5	
	OSPARE	88	1-2-3-5	
	OILBAR	89	1-2-5	
	PILPNT	90	1-2-5	
	PIPOHD	93	1-5	*(see check 1706)*
	PIPSOL	94	1-5	*(see check 1706)*
	PONTON	95	1-2-5	
	PRDARE	97	1-2-3-5	
	PYLONS	98	1-2-5	
	RAILWY	106	1-3-5	
	ROADWY	116	1-2-3-5	
	RUNWAY	117	1-2-3-5	
	SLCONS	122	1-2-3-5	
	SILTNK	125	1-2-5	
	TUNNEL	151	1-2-3-5	

CONRAD		82	
	BCNCAR	5	*
	BCNISD	6	*

	BCNLAT	7	*
	BCNSAW	8	*
	BCNSPP	9	*
	BRIDGE	11	*
	BUISGL	12	*
	BUAARE	13	*
	BOYCAR	14	*
	BOYINB	15	*
	BOYISD	16	*
	BOYLAT	17	*
	BOYSAW	18	*
	BOYSPP	19	*
	CBLOHD	21	*
	COALNE	30	*
	CONVYR	34	*
	CRANES	35	*
	DAMCON	38	*
	DYKCON	49	*
	FNCLNE	52	*
	FLODOC	57	*
	FORSTC	59	*
	HULKES	65	*
	LNDMRK	74	*
	LITFLT	76	*
	LITVES	77	*
	MORFAC	84	*
	NEWOBJ	163	*
	OFSPLF	87	*
	OSPARE	88	*
	PIPOHD	93	*
	PONTON	95	*
	PRDARE	97	*
	PYLONS	98	*
	SLCONS	122	*
	SILTNK	125	*
	SLOTOP	126	*
	SLOGRD	127	*
	WRECKS	159	*

CONVIS		83	
	BCNCAR	5	*
	BCNISD	6	*
	BCNLAT	7	*
	BCNSAW	8	*
	BCNSPP	9	*
	BRIDGE	11	*
	BUISGL	12	*
	BUAARE	13	*
	CBLOHD	21	*
	COALNE	30	*
	CONVYR	34	*
	CRANES	35	*
	DAMCON	38	*
	FNCLNE	52	*

	FLODOC	57	*
	FORSTC	59	*
	HULKES	65	*
	ICEARE	66	*
	LNDELV	72	*
	LNDMRK	74	* #
	LITFLT	76	*
	LITVES	77	*
	MORFAC	84	*
	NEWOBJ	163	*
	OFSPLF	87	*
	OSPARE	88	*
	PILPNT	90	*
	PIPOHD	93	*
	PONTON	95	*
	PRDARE	97	*
	PYLONS	98	*
	SLCONS	122	*
	SILTNK	125	*
	SLOTOP	126	*
	SLOGRD	127	*
	VEGATN	155	*
	WATFAL	157	*
	WRECKS	159	*

EXCLIT		92	
	LIGHTS	75	*

EXPSOU		93	
	MARCUL	82	*
	OBSTRN	86	*
	SOUNDG	129	*
	UWTROC	153	*
	WRECKS	159	*

FUNCTN		94	
	BUISGL	12	*
	LNDMRK	74	*

JRSDTN		103	
	ADMARE	1	* #

LITCHR		107	
	LIGHTS	75	* #

LITVIS		108	
	LIGHTS	75	*

MARSYS		109	
	BCNCAR	5	*
	BCNISD	6	*
	BCNLAT	7	*
	BCNSAW	8	*
	BCNSPP	9	*

	BOYCAR	14	*
	BOYINB	15	*
	BOYISD	16	*
	BOYLAT	17	*
	BOYSAW	18	*
	BOYSPP	19	*
	LIGHTS	75	*
	M_NSYS	306	* #

NATCON		112	
	BCNCAR	5	1-2-6-7-8-9
	BCNISD	6	1-2-6-7-8-9
	BCNLAT	7	1-2-6-7-8-9
	BCNSAW	8	1-2-6-7-8-9
	BCNSPP	9	1-2-6-7-8-9
	BRIDGE	11	1-2-4-5-6-7-8-9
	BUISGL	12	1-2-6-7-8-9
	BOYCAR	14	6-7-8-9
	BOYINB	15	6-7-8-9
	BOYISD	16	6-7-8-9
	BOYLAT	17	6-7-8-9
	BOYSAW	18	6-7-8-9
	BOYSPP	19	6-7-8-9
	CAUSWY	26	1-2-3-4-5-6-7
	DAMCON	38	1-2-3-4-5-6-7-9
	DAYMAR	39	1-2-4-6-7-8-9
	DYKCON	49	1-2-3-4-5-6-7-9
	FNCLNE	52	1-2-3-6-7-9
	FORSTC	59	1-2-3-6-7-9
	GATCON	61	1-2-6-7-9
	GRIDRN	62	1-2-6-7-9
	HRBFAC	64	1-2-3-6-7-9
	LNDMRK	74	1-2-3-6-7-8-9
	LITFLT	76	6-7-9
	LITVES	77	6-7-9
	MORFAC	84	1-2-6-7-9
	OBSTRN	86	1-2-3-6-7-9
	OFSPLF	87	1-2-6-7-9
	PONTON	95	1-2-6-7-9
	PYLONS	98	1-2-6-7-9
	ROADWY	116	1-2-4-5-6-9
	RUNWAY	117	1-2-4-5-6-7-9
	SLCONS	122	*
	SILTNK	125	1-2-6-7-8-9

NATSUR		113	
	LNDRGN	73	*
	OBSTRN	86	*
	SBDARE	121	* #
	SLOTOP	126	*
	SLOGRD	127	*
	UWTROC	153	9-14-18

NATQUA		114	

	LNDRGN	73	*
	OBSTRN	86	*
	SBDARE	121	* #
	UWTROC	153	4-8-9-10

PRODCT		123	
	BOYINB	15	1-2-18-19
	CONVYR	34	4-5-6-7-10-11-12-13-14-15-16-17-21-22
	OBSTRN	86	1-2-3-8
	OFSPLF	87	1-2
	OSPARE	88	1-2-4-6-10-14
	PIPARE	92	1-2-3-7-8-18-19-20
	PIPOHD	93	1-2-3-7-8-9-18-19-20-22
	PIPSOL	94	1-2-3-7-8-9-18-19-20-22
	PRDARE	97	*
	SILTNK	125	1-2-3-7-8-9-14-18-19-20-21-22

QUASOU		125	
	BERTHS	10	1-2-3-4
	DWRTCL	40	1-2-3-4
	DWRTPT	41	1-2-3-4
	DEPARE	42	1-2-3-4
	DRGARE	46	10-11 *(replaces check 1648)*
	DRYDOC	47	2-3-4-6-7-8-9
	FAIRWY	51	1-2-3-4
	GATCON	61	2-3-4-6-7
	MARCUL	82	1-2-3-4-6-7-8-9
	OBSTRN	86	1-2-3-4-6-7-8-9
	RCRTCL	108	1-2-3-4
	RECTRC	109	1-2-3-4-6
	SOUNDG	129	1-3-4-5-8-9-10-11
	SWPARE	134	1-6
	TWRTPT	152	1-2-3-4
	UWTROC	153	1-2-3-4-6-7-8-9
	WRECKS	159	1-2-3-4-6-7-8-9
	M_SREL	310	1-2-3-4-5-6-7-8-9-10-11

RESTRN		131	
	ACHARE	4	2-3-4-5-6-8-9-10-11-12-13-15-16-17-18-19-20-21-23-24-27
	CBLARE	20	1-2-3-4-5-6-7-8-9-10-11-12-13-14-16-17-18-19-20-21-22-23-24-25-27
	DWRTPT	41	1-2-3-4-5-6-8-9-10-11-12-13-14-16-17-18-19-20-21-22-23-24-25-27
	DRGARE	46	1-2-3-4-5-6-7-8-11-12-13-16-17-18-19-20-21-22-23-25-27
	DMPGRD	48	1-2-3-4-5-6-7-8-9-10-11-12-13-14-16-17-18-19-20-21-22-23-24-25-27
	FAIRWY	51	1-2-3-4-5-6-8-9-10-11-12-13-15-16-17-18-19-20-21-22-23-24-25-27
	ICNARE	67	1-2-3-4-5-6-7-8-9-10-11-12-13-14-16-17-18-19-20-21-22-23-24-25-27
	ISTZNE	68	1-2-3-4-5-6-8-9-10-11-12-13-18-19-20-21-22-23-24-25-27
	MARCUL	82	*
	MIPARE	83	*
	NEWOBJ	163	*

	OSPARE	88	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-27
	PIPARE	92	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-27
	PRCARE	96	1-2-3-4-5-6-8-9-10-11-12-13-14-16-17-18-19-20-21-22-23-24-25-27
	RESARE	112	*#
	SPLARE	120	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-27
	SUBTLN	133	1-2-3-4-5-6-7-8-9-10-11-12-13-14-16-17-18-19-20-21-22-23-24-25-27
	TESARE	135	1-2-3-4-5-6-7-8-9-10-11-12-13-14-16-17-18-19-20-21-22-23-24-25-26-27
	TSSCRS	147	1-2-3-4-5-6-8-9-10-11-12-13-16-17-18-19-20-21-22-23-24-25-27
	TSSLPT	148	1-2-3-4-5-6-8-9-10-11-12-13-16-17-18-19-20-21-22-23-24-25-27
	TSSRON	149	1-2-3-4-5-6-8-9-10-11-12-13-16-17-18-19-20-21-22-23-24-25-27

SIGGEN		140	
	FOGSIG	58	*

STATUS		149	
	AIRARE	2	1-2-4-5-6-7-8-12-14-16-17
	ACHBRT	3	1-2-3-4-5-6-7-8-9-14
	ACHARE	4	1-2-3-5-6-7-8-9-14
	BCNCAR	5	1-2-4-5-7-8-12-18
	BCNISD	6	1-2-4-5-7-8-12-18
	BCNLAT	7	1-2-4-5-7-8-12-18
	BCNSAW	8	1-2-4-5-7-8-12-18
	BCNSPP	9	1-2-4-5-7-8-12-18
	BERTHS	10	1-2-3-5-6-7-8-9-12-14
	BUISGL	12	1-4-6-7-8-12-13-14-16-17
	BOYCAR	14	1-2-5-7-8-18
	BOYINB	15	1-2-4-5-7-8-18
	BOYISD	16	1-2-5-7-8-18
	BOYLAT	17	1-2-5-7-8-18
	BOYSAW	18	1-2-5-7-8-18
	BOYSPP	19	1-2-5-7-8-18
	CBLARE	20	1-7-13
	CBLOHD	21	1-4-5-7-12
	CBLSUB	22	1-4-13
	CANALS	23	1-3-4-5-6-8-14
	CTSARE	25	1-2-3-5-6-7-9
	CAUSWY	26	1-8-12-14
	CHKPNT	28	1-2-5-7-9-12-16-17
	CGUSTA	29	1-4-5-16-17
	CONZNE	31	1
	CONVYR	34	1-4-6-12
	CRANES	35	1-4-6-12
	DAYMAR	39	1-4-5-7-8-12
	DWRTCL	40	1-3-6-9
	DWRTPT	41	1-3-6-9
	DOCARE	45	1-4-6-8-14

	DRYDOC	47	1-4-6-8-12-14
	DMPGRD	48	1-2-4-6-7
	FAIRWY	51	1-3-6-7-9
	FNCLNE	52	1-12
	FERYRT	53	1-2-4-5-6-7-8-9
	FSHZNE	54	1-5-6-7
	FSHFAC	55	1-4-5-6-7-8-12-16-17
	FSHGRD	56	1-5-6-7-8-14-16-17
	FLODOC	57	1-4-6-7-8-12
	FOGSIG	58	1-2-4-5-7-8-15
	FRPARE	60	1-6-8-14
	GATCON	61	1-4-6-16-17
	GRIDRN	62	1-4-6-8-14-16-17
	HRBARE	63	1-4-6-8-14-16-17
	HRBFAC	64	1-4-5-6-7-8-9-12-13-14-16-17
	ICEARE	66	1-2-5-16-17
	ICNARE	67	1-2-5-6-7-16-17
	ISTZNE	68	1-3-6-9-16-17
	LNDARE	71	6-7-8-12-14-16-17-18
	LNDMRK	74	1-2-4-5-7-8-12-13-14-16-17
	LIGHTS	75	1-2-4-5-6-7-8-11-14-15-16-17
	LITFLT	76	1-2-4-5-7-8-14-16-17
	LITVES	77	1-2-4-5-7-8-14-16-17
	LOKBSN	79	1-4-6-8-13-14-16-17
	LOGPON	80	1-2-4-5-6-7-8
	MARCUL	82	1-2-4-5-6-7-8-14-16-17
	MIPARE	83	1-2-5-6-7-16-17
	MORFAC	84	1-2-3-4-5-6-7-8-9-12-14-18
	NAVLNE	85	1-2-5-7-8-14
	NEWOBJ	163	*
	OBSTRN	86	1-4-5-7-8-13-18
	OFSPLF	87	1-2-4-7-8-12-16-17
	OSPARE	88	1-4-7-8-12
	OILBAR	89	1-2-4-7-8
	PILBOP	91	1-2-3-5-6-9-16-17
	PIPARE	92	1-4-7
	PIPOHD	93	1-4-7-12
	PIPSOL	94	1-4-7-12
	PONTON	95	1-2-4-5-6-7-8-12-14
	PRCARE	96	1-9
	PRDARE	97	1-4-8
	RADLNE	99	1-2-4-7
	RADRNG	100	1-2-4-7
	RADRFL	101	1-4-8
	RADSTA	102	1-2-4-7-8
	RTPBCN	103	1-2-4-5-7-8
	RDOCAL	104	1-3-4-5-6-7-9
	RDOSTA	105	1-2-4-5-7-8
	RAILWY	106	1-4-6-12
	RCRTCL	108	1-5-6-9
	RECTRC	109	1-2-5-6-8-9-14 *(replaces check 1680)*
	RCTLPT	110	1-6-9
	RSCSTA	111	1-2-4-5-7-8-14-16-17
	RESARE	112	1-2-3-4-5-6-7-9-18

	RETRFL	113	1-4-8
	RIVERS	114	1-2-5-8-14
	ROADWY	116	1-2-4-6-8-12-14
	RUNWAY	117	1-2-4-5-6-8-12-14
	SPLARE	120	1-2-3-4-5-6-7-8-9-14
	SLCONS	122	1-2-3-4-6-7-8-9-12-14-16-17
	SISTAT	123	1-2-4-5-7-8-12-14-15-16-17
	SISTAW	124	1-2-4-5-7-8-12-14-15-16-17
	SILTNK	125	1-4-12
	SMCFAC	128	1-2-3-4-5-6-7-8-9-12-14-16-17
	SOUNDG	129	18
	TS_PRH	136	1-2-5-7-18
	TS_PNH	137	1-2-5-7-18
	TS_TIS	139	1-2-5-7-18
	T_HMON	140	5
	T_NHMN	141	5
	T_TIMS	142	5
	TOPMAR	144	1-5-7-8-12-14
	TSELNE	145	1-3-9
	TSSBND	146	1-3-9
	TSSCRS	147	1-3-6-9
	TSSLPT	148	1-3-6-9
	TSSRON	149	1-3-6-9
	TSEZNE	150	1-3-9
	TUNNEL	151	1-3-4-6-8-14-16-17
	TWRTPT	152	1-3-6-9
	UWTROC	153	13-18
	WRECKS	159	7-13-18

SURTYP		153	
	M_SREL	310	*

TECSOU		156	
	DWRTCL	40	1-2-3-6-7-8-9-11-13
	DWRTPT	41	1-2-3-6-7-8-9-11-13
	DRGARE	46	1-2-3-6-7-8-9-11-13
	OBSTRN	86	1-2-3-4-5-6-7-8-9-10-11-12-13
	RCRTCL	108	1-2-3-6-7-8-9-11-13
	RECTRC	109	1-2-3-6-7-8-9-11-13
	SOUNDG	129	*
	SWPARE	134	6-8-13 *(see check 1654)*
	TWRTPT	152	1-2-3-6-7-8-9-10-11-13
	UWTROC	153	1-2-3-4-5-6-7-8-9-10-11-12-13
	WRECKS	159	1-2-3-4-5-6-7-8-9-10-11-12-13
	M_QUAL	308	*

T_ACWL		161	
	TS_TIS	139	*
	T_HMON	140	*
	T_NHMN	141	*

T_MTOD		163	
	TS_PRH	136	1-2 # *(see check 1560)*
	TS_PNH	137	3 (#) *(see check 1561)*

	T_HMON	140	1-2 # *(see check 1557)*
	T_NHMN	141	3 (#) *(see check 1558)*

TOPSHP		171	
	DAYMAR	39	* #
	TOPMAR	144	* #

TRAFIC		172	
	DWRTCL	40	* #
	DWRTPT	41	* #
	FAIRWY	51	*
	RDOCAL	104	* #
	RCRTCL	108	*
	RECTRC	109	* #
	TWRTPT	152	* #

VERDAT		185	
	BRIDGE	11	*
	CBLOHD	21	*
	CONVYR	34	*
	CRANES	35	*
	GATCON	61	*
	LIGHTS	75	*
	PIPOHD	93	*
	M_SDAT	309	* (#)
	M_VDAT	312	* (#)

WATLEV		187	
	CAUSWY	26	1-2-3-4-5-6
	GRIDRN	62	1-2-3-4-5
	LNDRGN	73	1-2-4-6
	MARCUL	82	1-2-3-4-5-7 #
	MORFAC	84	*
	NEWOBJ	163	*
	OBSTRN	86	1-2-3-4-5-7 #
	PYLONS	98	1-2-3-4-5-6
	SBDARE	121	3-4-5
	SLCONS	122	*
	UWTROC	153	3-4-5 #
	WRECKS	159	1-2-3-4-5 #

HORDAT		400	
	M_HOPA	304	* #

QUAPOS		402	
	M_SREL	310	*